

MONEY SUPPLY DETERMINATION

IN SAUDI ARABIA

by

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In the name of God the merciful  
the compassionate

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## TABLE OF CONTENTS

	Page
LIST OF TABLES . . . . .	vi
LIST OF ILLUSTRATIONS . . . . .	vii
ABSTRACT . . . . .	viii
1. INTRODUCTION . . . . .	1
2. INSTITUTIONAL SURVEY . . . . .	3
The Saudi Arabian Monetary Agency . . . . .	3
SAMA and Currency Developments . . . . .	4
SAMA and Banking Supervision . . . . .	8
Commercial Banks . . . . .	10
Specialized Public Institutions . . . . .	15
The Agricultural Bank . . . . .	15
The Industrial Development Fund . . . . .	16
The Public Investment Fund . . . . .	16
The Saudi Credit Bank . . . . .	17
The Real Estate Development Fund . . . . .	18
3. REVIEW OF THE LITERATURE . . . . .	19
The Monetary Base . . . . .	19
Definition and Derivation . . . . .	20
Positive and Negative Sources . . . . .	21
Uses of the Monetary Base . . . . .	29
The Money Supply Multiplier . . . . .	29
The Currency-demand Deposit Ratio (k) . . . . .	32
The Time-deposit Ratio (t) . . . . .	39
The Required Reserve Ratio (r) . . . . .	41
The Excess Reserve Ratio (e) . . . . .	43
4. THE ANALYSIS . . . . .	46
Behavior of the Determinants of Money Supply . . . . .	47
Monetary Base Components . . . . .	53
Money Supply Multiplier Determinants . . . . .	59
Seasonal Patterns in the Monthly Variations of	
Money Stock . . . . .	67
The Tests . . . . .	68
The Results . . . . .	69

TABLE OF CONTENTS--Continued

	Page
5. SAMA AND MONEY SUPPLY CONTROL . . . . .	73
Available Monetary Policy Instruments . . . . .	73
Reserve Requirements . . . . .	74
Foreign Exchange Operations . . . . .	75
Government Deposits . . . . .	76
Controlling Money Supply in Saudi Arabia . . . . .	77
APPENDIX A: CONVERSION FROM HEGIRA TO GREGORIAN DATES . . . . .	82
REFERENCES . . . . .	86

# LIST OF TABLES

Table	Page
1. Consolidated Balance Sheet of Commercial Banks (Millions S.R.) . . . . .	13
2. The Monetary Base (B) (Millions S.R.) . . . . .	22
3. Money Supply in Saudi Arabia (Millions S.R.) . . . . .	33
4. Gross Domestic Product and the Currency and Time-deposits Ratios . . . . .	37
5. The Average Monthly Change (Expressed as Annual Rate) of the Money Supply, Monetary Base, and Money Supply Multiplier 1385 to Mid-1395 A.H. (1965 to Mid-1975) . . . . .	48
6. Money Supply Monthly Percentage Change on an Annual Rate 1385-95 A.H. (1965-75) . . . . .	49
7. Money Supply Multiplier Monthly Percentage Change on an Annual Rate 1385-95 A.H. (1965-75) . . . . .	52
8. The Average Monthly Change (Expressed as Annual Rate) of the Components of the Monetary Base 1385 to Mid-1395 A.H. (1965 to Mid-1975) . . . . .	54
9. Foreign Exchange Monthly Percentage Change on an Annual Rate 1385-95 A.H. (1965-75) . . . . .	56
10. The Average Monthly Change on a Yearly Basis of the Components of the Money Multiplier 1385 to Mid-1395 A.H. (1965 to Mid-1975) . . . . .	60
11. Regression Coefficients and Associated Statistics . . . . .	70
12. Regression Coefficients and Associated Statistics . . . . .	80

## LIST OF ILLUSTRATIONS

Figure		Page
1.	Trend of the Monetary Base (Millions S.R.) . . . . .	51
2.	Trend of the Currency and Time-deposit Ratios . . . . .	62
3.	Trend of the Required Reserve and Excess Reserve Ratios . . . . .	65

## ABSTRACT

The purpose of this study is to examine the fluctuations in Saudi Arabia's money supply and analyze the main positive and negative factors that affect it. To this end the money supply hypothesis was used; i.e., the money stock (M) is the product of the monetary base (B) and the money supply multiplier (m). The essential elements of this equation and their effect on the money stock are analyzed. The components of Saudi Arabia's base money and the proximate determinants of the money multiplier are also analyzed. The two dominant sources of this monetary base are foreign exchange assets and government deposit accounts.

The sources of change in Saudi Arabia's money stock from 1385 to mid-1395 A.H. (1965-1975) are the basis for this study. It is determined that a seasonal pattern is evident in the monthly variations of these sources.

In the last part of this study, the monetary policy tools available to the Saudi Arabian Monetary Agency (SAMA) are outlined.



## CHAPTER 1

### INTRODUCTION

The Saudi Arabian Kingdom, which covers an area of 2.23 million square kilometers<sup>1</sup> and has a population of seven million,<sup>2</sup> occupies most of the Arabian peninsula on the southwest corner of Asia. Saudi Arabia was practically isolated from the western world until the discovery and export of oil in the late 1940's in commercial quantities.

During the 1950's, Saudi Arabian experienced a monetary crisis resulting from the rapidly rising government expenditures and a decrease in oil revenues. By the early 1960's, the Kingdom succeeded in solving its economic problems and started a new era of sound fiscal and monetary policies aimed at an accelerated economic development. Since 1970, however, the sharp rise in both production and prices of oil as well as increasingly better terms of agreement with the oil companies, has considerably strengthened the fiscal and external payment positions of Saudi Arabia.

To appreciate the emergence of Saudi Arabia as a major financial force on the monetary scene, it is appropriate to study the money supply determination process used in the Kingdom. This study

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<sup>1</sup>Saudi Arabian Monetary Agency [SAMA], Annual Report 1388-89 A.H. (1968-69) (Jeddah, Saudi Arabia: SAMA, 1969), p. 43.

<sup>2</sup>Saudi Arabian Monetary Agency [SAMA], Statistical Summary 1395-96 A.H. (1975-76) (Jeddah, Saudi Arabia: SAMA, 1976), p. 18.

will be within the framework of the money-supply hypothesis which states that the money stock (M) is the product of the monetary base (B) and the money supply multiplier (m). Within this framework we will discuss the essential elements of this equation and examine the monetary base and the money supply multiplier as they affect the money stock in Saudi Arabia.

This study will be divided into four parts. The first part will be an institutional survey, reviewing the monetary structure of the country. The second part will be a review of the literature relevant to Saudi Arabia. In the third part, we will analyze the money supply variations and investigate the sources of these changes. We will then see if these variations bear a seasonal pattern. The last part will be a discussion of money supply control in Saudi Arabia.

## CHAPTER 2

### INSTITUTIONAL SURVEY

Prior to 1950, the entire banking system in Saudi Arabia consisted of a branch office of one foreign commercial bank (The Netherlands Trading Society) and a network of money changers.<sup>1</sup> These institutions were the only vehicles through which the country's limited banking operations were conducted. There was no central bank nor any kind of banking control. The Ministry of Finance was the authority responsible for the issue of currency and coins and for the exercise of monetary control.

Today, the Saudi Arabian financial structure is comprised of the following three main institutions: (1) The Saudi Arabian Monetary Agency, (2) Commercial Banks, and (3) Public Specialized Institutions. We are going to review the developments of each of the aforementioned institutions separately.

#### The Saudi Arabian Monetary Agency

The study of the Saudi Arabian Monetary Agency (SAMA) can be divided into two parts: The first part will cover currency developments, and the second will cover banking supervision.

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<sup>1</sup>Anwar Ali, The Role of the Saudi Arabian Monetary Agency (Jeddah, Saudi Arabia: Saudi Arabian Monetary Agency, April 1971), p. 4.

## SAMA and Currency Developments

In the early fifties steady annual oil income began to flow in to Saudi Arabia, leading in turn to increases in the amount of government expenditures. At that time, also, the government thought that certain fiscal and monetary reforms would accelerate the country's economic development.

The first item of these reforms was the creation of a modified central bank (by Royal Decree No. 30/4/1046, dated April 20, 1952) under the name of Saudi Arabian Monetary Agency, with the following main functions:

1. To strengthen the currency of the State, and stabilize and fix its value in relation to foreign currencies
2. To aid the Ministry of Finance in centralizing the receipts and expenditures of the government and in controlling expenditures in accordance with items of the authorized budget<sup>2</sup>

The Agency was prohibited from dealing in the following activities:

1. Lending money to the government or to private individuals
2. Paying or receiving interest
3. Issuing paper money<sup>3</sup>

The second step, after the creation of SAMA, was the establishment of a dual currency system, consisting of Saudi Gold Sovereigns and

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<sup>2</sup>Ramon Knauerhase, The Saudi Arabian Economy (New York: Praeger Publishers, 1975), p. 238.

<sup>3</sup>Ibid.

Saudi Silver Riyals, with a fixed exchange rate of 40 Saudi Riyals to one Saudi Gold Sovereign.<sup>4</sup> Although the Saudi Arabian Gold Sovereign has the same size, weight, and fineness as the British Gold Sovereign, it replaced the latter because British currency was being used in several countries and its value could not be controlled by the Saudi Arabian authorities.<sup>5</sup>

The experiment with the new currency arrangement was of short duration, however. Because of the increased incidence of counterfeiting the Saudi Arabian Gold Sovereign, it was withdrawn from circulation between December 1953 and January 1954. In the meantime, SAMA issued a new paper money, called "pilgrim's receipts," (in the form of ten Riyal bills) to facilitate transactions during the pilgrimage season.<sup>6</sup> Although it was not legal tender, the new paper money was accepted immediately by the public in exchange for goods and services. In 1955, the silver Riyals were withdrawn from circulation and replaced by "pilgrim's receipts" of one Riyal bill; and an official fixed exchange rate between the new Riyal and the U.S. dollar was set at S.R. 3.75 per U.S. dollar.<sup>7</sup>

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<sup>4</sup>Y. A. Nimatallah, "Coordination of Monetary and Fiscal Policies in Saudi Arabia" (Ph.D. dissertation, University of Massachusetts, 1967), pp. 160-169.

<sup>5</sup>M. E. Edo, "Currency Arrangements and Banking Legislation in the Arabian Peninsula," International Monetary Fund Staff Papers (Washington, D.C.: International Monetary Fund, July 1975), p. 513.

<sup>6</sup>Ali, Role of SAMA, p. 6.

<sup>7</sup>Nimatallah, pp. 160-169.

Two of the foregoing restrictions imposed upon SAMA were removed (i.e., lending money to the government and issuing paper money) to provide the government with funds necessary for its expenditures. Government expenditures at that time were rising at a rate higher than its revenues. Oil income revenues, which had increased from \$56.7 million in 1370 A.H. (1950) to \$340.8 million in 1374-75 (1954-55), declined by about fifteen percent in the next year (i.e., 1956).<sup>8</sup> These developments led to the expansion of the money supply and, correspondingly, to an increase in the Saudi demand for imports in the absence of a comparable increase in the country's foreign-exchange earnings.

As a result, during 1375-77 (1955-57) the country suffered a financial crisis as well as a balance-of-payments deficit. SAMA foreign-exchange reserves touched a low rate of fourteen percent of the currency in circulation, and the free-market value of the Saudi Riyal had plunged from the official rate of S.R. 3.75 per U.S. dollar to S.R. 6.25 per U.S. dollar.<sup>9</sup> Fiscal deficits were met by external and internal loans, and the government indebtedness reached S.R. 1500 million (U.S.\$333.3 million).<sup>10</sup>

In view of this problem, the Saudi government with the help of the International Monetary Fund introduced a stabilization program

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<sup>8</sup>SAMA, Annual Report 1380 A.H. (1960), p. 3.

<sup>9</sup>Ibid.

<sup>10</sup>Ali, Anwar, Monetary and Fiscal Policies in Saudi Arabia (Jeddah, Saudi Arabia: SAMA, 1969), p. 3.

aimed at cutting government expenditures and balancing the budget.<sup>11</sup> This program also included provisions for the repayment of debts and the operation of a dual exchange system, and banned the importation of certain luxury items.<sup>12</sup>

By mid-1380 (1960) the entire debt had been paid off, a new unified rate of exchange of S.R. 4.50 per U.S. dollar was introduced, and the Saudi currency was declared to be convertible.<sup>13</sup> In that same period, Royal Decree No. 6 authorized SAMA to issue a new paper currency of different denominations, which was to be negotiable legal tender, to replace the old "pilgrim's receipts."<sup>14</sup> Moreover, the same Royal Decree authorized SAMA to invest foreign-exchange reserves in foreign securities in accordance with the usual practice of central banks.

Saudi Arabia maintained the gold content of its currency unchanged from the date of its first issue until the middle of 1393 (1973), resulting in two appreciations of the Saudi Riyal against the U.S. dollar--in December 1971 and in February 1973. The total effect of these two devaluations of the U.S. dollar was an appreciation of 20.64 percent in the parity of the Riyal with respect to the dollar.<sup>15</sup>

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<sup>11</sup>SAMA, Annual Report 1380 A.H. (1960), pp. 3-6.

<sup>12</sup>Ibid.

<sup>13</sup>Ibid.

<sup>14</sup>"Currency Statute," Saudi Arabian Royal Decree No. 6, Rajab 1379 (December 1959) (Jeddah, Saudi Arabia: Saudi Arabian Government Printing Office, 1959), p. 1.

<sup>15</sup>SAMA, Annual Report 1391-92 A.H. (1971-72), p. 29.

Then in Rajab 1393 (August 1973), Saudi Arabia revalued the Riyal by 5.0 percent by raising its gold content from 0.197582 grams to 0.207510 grams of fine gold per Riyal, thereby setting the dollar/Riyal exchange rate at S.R. 3.55 per dollar.<sup>16</sup>

For transaction purposes Saudi Arabia linked its currency to the U.S. dollar; this action caused the Riyal to depreciate along with the U.S. dollar against several major currencies in 1974. In response to this situation the Kingdom decided, in early 1975, to link its currency to the Special Drawing Right, which is a basket of currencies calculated by the International Monetary Fund daily on the basis of a weighted average of rates for sixteen major currencies.<sup>17</sup> Consequently, in March 1975 the new dollar/Riyal rate settled at S.R. 3.47 per dollar, implying an appreciation of 2.3 percent for the S.R.<sup>18</sup> Since then, rates have been permitted to fluctuate within margins wider than 2.25 percent of the Riyal par value, but not exceeding 7.25 percent.

#### SAMA and Banking Supervision

The expansion of the banking sector was substantial during the fifties, but SAMA at that time had little to do with regulating the banking system. This was due in part to its preoccupation with the stabilization programs of the currency as well as to the fact that it

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<sup>16</sup>SAMA, Annual Report 1392-93 A.H. (1972-73), p. 33.

<sup>17</sup>SAMA, Annual Report 1395 A.H. (1975), p. 27.

<sup>18</sup>Ibid.



was not provided with the necessary power under existing legislation to widen the scope of its regulatory activities.

In Moharram 1378 (July 1958), all commercial banks were required to submit financial statements to SAMA in a prescribed form every month.<sup>19</sup> By Rajab 1378 (January 1959), commercial banks were required to deposit with the Monetary Agency fifteen percent of their deposit liabilities as compulsory reserves and to maintain adequate liquidity ratios.<sup>20</sup> In 1381 (1961), the statutory reserve requirement was decreased from 15 percent to 10 percent to relieve pressures caused by a rising demand for credit.<sup>21</sup> In 1383 (1964), Royal Decree No. 37 was promulgated, putting into effect the Commercial Paper Act, which constituted the first official recognition and regulation of bills of exchange, promissory notes, and checks.<sup>22</sup>

After these developments, SAMA felt that there was yet a need for comprehensive banking-control legislation to ensure that the banking system would develop on a sound basis; and thus it worked toward that goal. In Safar 1386 (June 1966), the banking-control law was enacted. This new law stated that "Every bank shall maintain with SAMA at all times a statutory deposit of 15 percent of its deposit

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<sup>19</sup>SAMA, Annual Report 1380 A.H. (1960), p. 19.

<sup>20</sup>Ibid.

<sup>21</sup>SAMA, Annual Report 1381-82 A.H. (1961-62), p. 21.

<sup>22</sup>SAMA, Annual Report 1382-83 A.H. (1962-63), p. 22.

liabilities, and the Agency may vary the aforesaid percentage provided that it shall not be reduced below 10 percent or increased to more than 17.5 percent."<sup>23</sup> In addition, every bank was to maintain a liquid reserve of not less than 15 percent of its deposit liabilities, and the Agency could increase this percentage to 20 percent.<sup>24</sup> In fact, besides giving enabling powers to the Monetary Agency for issuing regulation on various matters, this law prescribed the procedure for the establishment of banks, the ratio of capital to deposits, and the building up of free reserves. It also outlined the limits to which banks may hold real estate or make investments, and defined transactions which commercial banks may not undertake. Thus, the law equipped SAMA with the instruments it needed for an effective monetary policy.

#### Commercial Banks

The growth of commercial banks has proceeded rapidly along with the corresponding development of the Saudi economy. In 1378 (1968) there was only one bank operating in the Kingdom; by the end of 1394 (1974) there were twelve, with 77 permanent offices and branches and 13 seasonal offices.<sup>25</sup> Two of these banks are Saudi owned, three are Arab owned, and the remaining seven banks are non-Arab owned.

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<sup>23</sup>"Banking Control Law," Royal Decree No. M/5, Safar 1386 (June 1966), Jeddah, Saudi Arabia, p. 7.

<sup>24</sup>Ibid.

<sup>25</sup>SAMA, Annual Report 1395 A.H. (1975), p. 3.

The main role of commercial banks is to provide and develop traditional short-term facilities. However, in the absence of specialized medium-term institutions in the Kingdom, commercial banks have been accommodating medium-term financing requirements through revolving lines of credit to selected customers, with special emphasis on industrial and development projects. Also, long- and short-term financing is available in U.S. dollars as well as in other foreign currencies.

Private deposits constitute the principal source of funds for commercial banks, which generally do not pay interest on current account credit balances. Savings accounts are encouraged by local banks; these accounts represent a significant part of the total bank deposits. Commercial banks' total deposits rose from S.R. 934 million at the end of 1385 (April 1966) to S.R. 6340 million at the end of 1394 (January 1975), indicating a 578.8 percent rate of growth.<sup>26</sup> Over a short period of two years, between mid-1392 (August 1972) and mid-1394 (July 1974), total deposits more than doubled. This rapid increase reflects the rapid growth of personal income and the increased dependency of the public on the banking system.

With the substantial increase in deposits, commercial banks' cash in hand and deposits with SAMA also increased rapidly, from S.R. 253 million at the end of 1386 (April 1966) to the level of S.R. 1959 million at the end of 1394 (January 1974).<sup>27</sup> The excess liquidity in the private sector gave rise to a relatively slower growth in

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<sup>26</sup> SAMA, Statistical Summary 1395-96 A.H. (1975-76), p. 47.

<sup>27</sup> Ibid.

the demand for credit from the commercial banks. While total deposits grew about six times, lending to the private sector rose from S.R. 938 million at the end of 1385 (April 1966) to S.R. 4410 million at the end of 1394 (January 1975), an increase of 370.2 percent, mostly in response to the demand for finance for imports and construction.<sup>28</sup>

In spite of the fact that over the years there had been a large outflow of Saudi private capital, in the sixties the commercial banks played a minimal role in the development of the Kingdom's foreign investments. Table 1a shows that commercial banks' foreign assets registered a relatively moderate growth from 1385 to 1391 (1965-71), then increased substantially from 1392 to 1394 (1972-74). This rise reflects in part the increasing international activities of local banks during the seventies. The National Commercial Bank is a participant in the European Arab Bank as well as in the Banque Arabe et Internationale d'Investissement (BAII), which is based in Paris. The National Commercial Bank also has a branch in Lebanon. The Riyadh Bank is a participant in the consortia bank, Union de Banques Arabes et Francaises (UBAF). Both of these banks are also participants in the Saudi International Bank, which was set up in London to carry out international merchant banking activities.

SAMA has been encouraging the spread of banking facilities throughout the Kingdom; thus, bank branches have been opened in almost all towns with a population of more than 10,000.<sup>29</sup> To accelerate this

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<sup>28</sup>SAMA, Statistical Summary 1395-96 A.H. (1975-76), p. 46.

<sup>29</sup>Knauerhase, p. 252.

TABLE 1

CONSOLIDATED BALANCE SHEET OF COMMERCIAL BANKS  
(Millions S.R.)

a. Assets														
</														

TABLE 1--Continued

b. Liabilities		D E P O S I T S												
		MONETARY				QUASI MONETARY								
Date				Busi- ness & Indivi- duals	Offi- cial Enti- ties		Time For- & eign Sav- ings	Cur- rency	For L/Cs	For Guar- antees	For- eign Liabi- lities	Capi- tal & Re- serves	Unclassi- fied Liabi- lities	TOTAL ASSETS & LIABI- ILITIES
Hegira	Gregorian	TOTAL	Total			Total								
		1	2	3	4	5	6	7	8	9	10	11	12	13
1385	Mid 24-10-65	891	538	469	69	353	118	51	110	74	157	143	258	1,450
	End 20- 4-66	934	570	484	86	364	116	73	97	78	185	143	271	1,533
1386	Mid 14-10-66	1,042	619	525	94	423	151	71	119	82	239	144	238	1,663
	End 10- 4-67	1,123	667	547	120	456	183	99	94	80	201	138	260	1,723
1387	Mid 3-10-67	1,234	701	586	114	534	199	114	130	92	174	143	379	1,930
	End 29- 3-68	1,322	759	659	100	563	251	101	113	97	166	145	783	2,416
1388	Mid 22- 9-68	1,357	740	638	101	618	291	96	118	113	130	147	559	2,193
	End 18- 3-69	1,469	804	684	120	665	353	87	117	108	180	148	809	2,607
1389	Mid 11- 9-69	1,471	808	665	143	663	377	68	125	93	163	156	1,152	2,942
	End 7- 3-70	1,560	839	685	153	722	410	87	121	104	166	167	869	2,762
1390	Mid 1- 9-70	1,609	812	696	116	797	482	88	119	109	150	167	797	2,723
	End 25- 2-71	1,736	868	721	147	869	561	88	113	107	181	178	834	2,929
1391	Mid 21- 8-71	1,877	968	797	171	909	565	90	130	123	148	185	752	2,962
	End 15- 2-72	2,116	1,007	877	130	1,109	730	98	131	150	257	194	773	3,339
1392	Mid 9- 8-72	2,530	1,309	1,071	238	1,220	738	113	157	213	296	198	744	3,768
	End 3- 2-73	2,863	1,465	1,275	191	1,397	851	160	186	200	292	205	605	3,965
1393	Mid 29- 7-73	3,730	2,259	1,949	310	1,471	814	139	270	248	392	211	947	5,280
	End 23- 1-74	4,077	2,311	1,983	328	1,766	801	313	331	321	419	243	1,117	5,856
1394	Mid 19- 7-74	5,357	3,195	2,834	361	2,162	913	433	434	382	873	285	1,055	7,569
	End 12- 1-75	6,340	3,711	3,312	398	2,630	1,121	506	501	502	873	348	1,429	8,991

SOURCE: Research and Statistics Departments, Saudi Arabian Monetary Agency, Statistical Summary 1395/96 A.H. (1975/76) (Jeddah, Saudi Arabia: Saudi Arabian Monetary Agency, 1976), pp. 46-47.

progress, SAMA has subsidized the establishment of private branches.<sup>30</sup> In mid-1394 (1974), 28.4 percent of the banking facilities were located in the central region, 29.7 percent in the eastern region, and 41.9 percent in the western region.<sup>31</sup> This pattern accurately reflects the distribution of non-oil economic activity in the country.

### Specialized Public Institutions

#### The Agricultural Bank

When this institution was established, in 1384 (1964), its initial capital was S.R. 30 million, subscribed entirely by the Saudi government. This figure rose to S.R. 53 million by 1390 (1970).<sup>32</sup> The Bank's function was to provide loans and credit facilities for purposes of assisting in the development, encouragement and stimulation of agriculture. Since its inception the Agricultural Bank has made 35,595 loans, totalling S.R. 159 million. After eleven years, the number of annual loans grew by 658 percent, from 714 in 1384-85 (1964-65) to 5,414 in 1393-94 (1973-74).<sup>33</sup> And the total annual value of loans extended rose more than eight times, from S.R. 4.4 million to S.R. 36.3 million.<sup>34</sup>

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<sup>30</sup>Ali, Role of SAMA, p. 9.

<sup>31</sup>SAMA, Annual Report 1395 A.H. (1975), p. 100.

<sup>32</sup>SAMA, Annual Reports 1381-82 A.H. (1961-62) and 1390-91 A.H. (1970-71), p. 11 and p. 26.

<sup>33</sup>SAMA, Annual Report 1395 A.H. (1975), p. 101.

<sup>34</sup>Ibid.

### The Industrial Development Fund

This fund was created in March 1974, with an initial capital of S.R. 500 million.<sup>35</sup> The Industrial Development Fund will grant to the private sector medium- and long-term interest-free loans up to fifty percent of the total capital needs, to assist and encourage the establishment or expansion of industries in the country. By the end of Jumadi Al-thani 1395 (July 1975), this organization had approved twenty loans, totalling S.R. 127 million.<sup>36</sup>

### The Public Investment Fund

At its inception in 1391-92 (1971-72), this fund had initial capital of S.R. 350 million. After successive increases in later years, this figure rose to S.R. 5800 million.<sup>37</sup> The original purpose of the Public Investment Fund was to finance commercially-oriented productive investments of the government and public corporations--undertaken independently or in collaboration with the private sector.<sup>38</sup> However, in 1394 (1974), this fund was authorized to participate as well in newly-established industrial, agricultural or commercial enterprises incorporated in the Kingdom.<sup>39</sup> Since the beginning of operations in 1392-93 (1972-73), the Public Investment Fund has granted to both

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<sup>35</sup>SAMA, Annual Report 1392-93 A.H. (1972-73), p. 36.

<sup>36</sup>SAMA, Annual Report 1395 A.H. (1975), p. 34.

<sup>37</sup>Ibid.

<sup>38</sup>Ibid.

<sup>39</sup>Ibid.



the Saudi Arabian Airlines (SAUDIA) and the Agency of Petroleum and Mineral Resources (PETROMIN) a total of S.R. 1073.3 million for the purchase of aircraft, plants, and equipment.<sup>40</sup> The fund also participated, by an amount of U.S.\$67.8 million, in the U.S.\$500 million capital of the Kuwait-based Arab Maritime Company; and by an amount of U.S.\$60 million, in the U.S.\$400 million capital of the Suez-Mediterranean Pipeline Company (SUMED).<sup>41</sup>

#### The Saudi Credit Bank

This institution was founded in Zul-Hijjah 1393 (December 1973). Its initial capital of S.R. 5 million was supplemented by an additional S.R. 40 million in government deposits and outright grants.<sup>42</sup> The Saudi Credit Bank grants interest-free loans for specified social and economic purposes, in amounts not exceeding S.R. 5,000, to Saudi citizens whose annual income does not exceed S.R. 12,000.<sup>43</sup> By the end of the first quarter of 1395 (1975), this Bank had disbursed a total of S.R. 28.4 million in loans.<sup>44</sup>

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<sup>40</sup>SAMA, Annual Report 1395 A.H. (1975), p. 34.

<sup>41</sup>Ibid.

<sup>42</sup>Ibid.

<sup>43</sup>SAMA, Annual Report 1391-92 A.H. (1971-72), p. 27.

<sup>44</sup>SAMA, Annual Report 1395 A.H. (1975), p. 36.

### The Real Estate Development Fund

This fund was established in July 1974 with initial capital of S.R. 250 million, which rose to S.R. 2,000 million in May 1975.<sup>45</sup> The function of the Real Estate Development Fund is to grant medium- and long-term loans for home construction purposes--to Saudi nationals in low- and medium-income brackets, up to seventy percent of costs.<sup>46</sup> On loans granted to Saudi citizens who build their own homes, two-sevenths will be subsidized by government grants and the remaining five-sevenths will be repayable.<sup>47</sup> The fund also provides loans to Saudi companies for construction of housing compounds for their employees, up to fifty percent of the cost of each unit, and to Saudi establishments for construction of residential compounds with multi-housing units for rental or hotel purposes, up to fifty percent of costs. In addition, this fund can participate in the development and improvement of cities and towns through the acquisition of old sections for the purpose of planning new residential and commercial complexes.<sup>48</sup>

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<sup>45</sup> SAMA, Annual Report 1395 A.H. (1975), p. 36.

<sup>46</sup> Ibid.

<sup>47</sup> Ibid.

<sup>48</sup> Ibid.

## CHAPTER 3

### REVIEW OF THE LITERATURE

In attempting to explain how a nation's money stock is determined, one may use the money-supply hypothesis proposed by Albert E. Burger: Money stock (M) is expressed as the product of the monetary base (B) and the money-supply multiplier (m).<sup>1</sup> Burger feels that within this framework we can best analyze how the actions of the monetary authorities and how the consequent behavioral actions of the commercial banks and the public may affect the money supply process; in addition, we can consider the influences that institutional conditions and changes may bring to bear upon this process.

In the equation  $M = Bm$ , the term "B" represents the monetary base determined by the actions of the monetary authorities, and "m" represents all other factors which operate to affect the stock of money. In the pages which follow we will discuss in further detail each of these two major determinants of the money stock.

#### The Monetary Base

The monetary base summarizes the effects of actions by the monetary authorities on the money stock and is the main factor determining the growth of the stock of money. In Saudi Arabia, monetary

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<sup>1</sup>Albert E. Burger, The Money Supply Process (Belmont, Calif.: Wadsworth Publishing Co., 1971), p. 4.

authority rests with the Saudi Arabian Monetary Agency (SAMA), and movements of the monetary base are dominated by changes in SAMA holdings of foreign exchange, gold, investments, government deposits, and in the legal reserve requirements imposed upon commercial banks' demand and time deposits. SAMA actions of this nature determine total bank reserves and the amount of currency in circulation, which together comprise the base upon which the money stocks rest.

In the following discussion, we shall first define the monetary base and discuss its derivation. Second, we shall explore the positive and negative sources of this base and discuss their effects upon the money supply. Last, we shall analyze the uses of the base money in relation to the money stock.

#### Definition and Derivation

The monetary base (B) has been defined by Burger as the net monetary liabilities of the monetary authorities held by commercial banks and the non-bank public.<sup>2</sup> Alternatively, the base money (B) may be obtained by the following equation:

$$B = C_p + V + R$$

where  $C_p$  is currency in the hands of the public, V represents notes held by commercial banks, and R represents commercial banks' deposits held by the monetary authorities.<sup>3</sup>

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<sup>2</sup>Burger, p. 8.

<sup>3</sup>Ibid., p. 21.

Actions taken by the government and SAMA determine the size of the stock of the base money in Saudi Arabia and the rate at which it is supplied, while commercial banks and the public determine the uses of the monetary base. SAMA and government control over the monetary base supply induces the banks and the public to adjust their holdings of currency as well as their real and financial assets in order to hold the amount of base money equal to what was supplied by SAMA actions.

The monetary base has been derived from the balance sheet of SAMA. This statement is included in every annual report and statistical summary published by SAMA under the title of "Saudi Arabian Monetary Agency Balance Sheet as of (date)." From the assets and liabilities items of this statement, we can construct a table delineating the sources and uses of the monetary base. Analyzing the monetary base (B), first in terms of its principal sources and then in terms of uses, will help to reveal the processes that determine its behavior.

Table 2 gives us the monetary base in terms of competing sources and uses on two different dates. The first date, Zul-Hijjah 1385 (April 1966), corresponds with the last month of the initial year of our study, and the second, Zul-Hijjah 1394 (January 1975), with the last month of the final year of the study. The table reveals that from the first to the second date, the monetary base jumped from S.R. 1316 million to S.R. 6032 million, an increase of 458.4 percent.

#### Positive and Negative Sources

The positive sources of the base are foreign exchange, gold, investments in foreign bonds, and other assets; the negative sources

TABLE 2  
THE MONETARY BASE (B)  
(Millions S.R.)

SOURCES OF THE BASE	ZUL-HIJJAH 1385 (April 1966)	ZUL-HIJJAH 1394 (Jan. 1975)	USES OF THE BASE	ZUL-HIJJAH 1385 (April 1966)	ZUL-HIJJAH 1394 (Jan. 1975)
<u>Positive Sources</u>					
Foreign Exchange	2,971	51,234	Currency held by the public	1,062	4,073
Gold	349	546			
Investments*	237	25,992	Notes held by commercial banks	97	321
Other Assets	191	711			
<u>Less: Negative Sources</u>					
Government Accounts	1,664	63,574	Commercial banks' deposits at SAMA	157	1,638
Reserve	16	21			
Other Liabilities	<u>752</u>	<u>8,856</u>			
EQUAL: Sources of the Base	1,316	6,032	EQUAL: Uses of the Base	1,316	6,032

SOURCE: Saudi Arabian Monetary Agency, Annual Reports 1386-87 and 1395 A.H. (1967 and 1975) (Jeddah, Saudi Arabia: Saudi Arabian Monetary Agency, 1967 and 1975), pp. 48-55 and 93-103.

\*Investments consist of foreign government guaranteed bonds, government treasury bills, and foreign banks' certificates of deposits.

are government accounts, reserves, and other liabilities. We will discuss each of these sources and their effects upon the monetary base.

Foreign Exchange. SAMA holdings of foreign exchange showed substantial growth during the period under study, from the level of S.R. 2971 million in Zul-Hijjah 1385 (April 1966), skyrocketing to S.R. 51,234 million in Zul-Hijjah 1394 (January 1975). Acting as a central bank, SAMA receives almost all the foreign exchange earnings of the country, either as revenues from oil companies or in return for selling Saudi Riyals to pilgrims and foreign companies in the Kingdom. It channels foreign exchange through local banks, which make it available for the finance of imports, travel to foreign countries, and capital transfers. Every rise in Saudi oil exports will boost SAMA holdings of foreign exchange; an increase in imports, on the other hand, will reduce these holdings since importers pay by foreign exchange for their imports. Thus, variations in foreign exchange holdings are directly related to movements in the balance of payments. A balance-of-payment deficit depletes the foreign exchange reserves, and an active balance of payments adds to SAMA reserves of foreign exchange. The large surpluses realized in the balance of payments during the period under study swelled SAMA holdings of foreign exchange.

These huge reserves of foreign exchange guarantee the cover of the Saudi Arabian currency and encourage its steady growth. SAMA is authorized to issue notes equivalent to the value of gold and foreign

exchange it holds. According to Royal Decree No. 6, dated 7/1/1379 (December 1959), SAMA is required to maintain a one hundred percent cover for the notes issued in gold and currencies convertible into gold.<sup>4</sup> But the currency in circulation did not respond to the rapid rise in foreign exchange during the period under study. As we noticed before, foreign exchange grew more than sixteen-fold, while the currency in circulation rose almost four-fold, from S.R. 1159 million in Zul-Hijjah 1385 (April 1966) to S.R. 4394 million in Zul-Hijjah 1394 (January 1975).

SAMA reserves of foreign exchange are divided between the issue and banking departments.<sup>5</sup> The amount held by the issue department is equal to the amount of currency issued, and the extra foreign exchange is kept in a separate account at the banking department. When more notes are needed, the required foreign exchange is transmitted from the banking to the issue departments. Conversely, when there is an excess note issue, it is withdrawn from circulation and a comparable amount of foreign exchange is transferred from the issue to the banking departments. This method reduces the effect of foreign exchange reserves on the money supply, especially in the short run.

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<sup>4</sup>SAMA, Annual Report 1380 A.H. (1960), p. 6.

<sup>5</sup>Ahmed A. Malik, "The Money Supply Process in Saudi Arabia" (Ph.D. dissertation, unpublished, Indiana University, September 1970), pp. 176-209.



Among the positive sources of the base, the foreign exchange holdings of SAMA are the largest. The larger the amount of foreign exchange reserves that SAMA accumulates, the greater its ability to create more liabilities against these holdings. Therefore, changes in these assets have an influence on the monetary base, and hence the money supply. A few examples might prove helpful in explaining this mechanism.

Example One: The government receives payment in foreign exchange for the sale and export of oil.

This causes an increase in government deposits at SAMA, and an equal increase in the foreign assets of SAMA. As a result, there is no increase in the money stock. Thus, a cash payment for oil, by itself, has no impact on the domestic money stock.

Example Two: The government pays local contractor for the construction of a new building.

This causes a reduction in government deposits at SAMA and an increase in the money stock. Since the bulk of the economic development expenditures in Saudi Arabia will be made by the government, the money stock will increase proportionately. However, domestic government expenditures will increase money incomes, which in turn will increase the demands for imports. And, imports that involve a foreign exchange transaction reduce the money stock.

Example Three: Local merchants import grain and industrial equipment.

The merchants must purchase from the banks the required foreign exchange, using domestic currency. This would cause a decline in the foreign exchange assets of commercial banks, and would impel them to take one of the following steps: (1) buy more foreign exchange from SAMA, which would lead to a reduction in SAMA's holdings of foreign exchange and an increase in its holdings of local currency, resulting in a reduction in the money stock; or (2) the banks, as a result of the reduction in their foreign exchange assets, will be induced to grant fewer loans to the public, thus

causing a reduction in the money stock. Hence, when foreign exchange is used for imports, it would result in a reduction in the foreign assets of either the commercial banks or SAMA, which in turn causes a reduction in money supply.

Gold. The second positive source of the monetary base, i.e., gold, remained relatively stable throughout the period under study. As has been mentioned before, the monetary cover in Saudi Arabia is divided between gold and foreign exchange holdings. In the period from 1385 (1965) to 1394 (1974) the proportion of gold in the monetary cover declined from 27.5 percent to 11.1 percent. This is largely due to the fact that the government revenues, which are mainly from oil, are paid in foreign exchange (mostly U.S. dollars). The effect of gold on the monetary base is the same as that of foreign exchange. The greater the holdings of gold by SAMA, the better its ability to increase more liabilities against these reserves, and therefore help in the base money expansion.

Investments. Investments in foreign bonds have developed dramatically during the period of study, from a level of S.R. 349 million in Zul-Hijjah 1385 (April 1966), skyrocketing to S.R. 25,992 million in Zul-Hijjah 1394 (January 1975). Foreign bonds, which are bought from foreign central banks in exchange for gold or foreign exchange, are of short duration. These foreign bonds can be sold by SAMA to obtain foreign exchange or gold when there are needs for more reserves. Thus, the monetary base may be affected by SAMA holdings of

foreign bonds in the same way that it would be with gold and foreign exchange reserves.

Other Assets. Other assets comprise the last positive source of the monetary base. Although the figure recorded for this source in 1385 (1965) increased by 372.3 percent by the end of the period of study, the effect of other assets upon the base money is not that significant.

Government Accounts. Among the negative sources of the monetary base, the effect of government accounts is most striking. As a result of the economic crisis that occurred in the 1950's, Saudi Arabia adopted a balanced-budget policy throughout the 1960's and during the period under study. Ex ante government expenditures were always equal to ex ante government receipts, but ex post government expenditures were less than ex post government receipts. This is due to the fact that oil-income forecasts usually turned out to be less than the actual accruing revenues. Government accounts with SAMA grew substantially through the period of study as a consequence of the surpluses in the government budgets.

In addition to the regular annual oil revenues, the government finances its annual expenditures partially from the accumulated government accounts with SAMA. Financing annual government expenditures from government deposits at SAMA will have a positive effect on the monetary base because this negative source of the base money will be reduced by the amount taken for the budget. For example, let us assume that

the government decided to finance the fiscal budget of 1389-90 (1969-70) by S.R. 150 million from these accumulated accounts of SAMA and that the various government ministries paid this amount as salaries to employees (salaries in Saudi Arabia are paid in cash). In this case, currency in the hands of the public will rise by an equal amount of S.R. 150 million; and since currency in the hands of the public is a major component of the monetary base, the latter will rise by the same amount. If, however, only half of the S.R. 150 million (i.e., S.R. 75 million) is used up, then currency in the hands of the public and the monetary base will be increased by only S.R. 75 million.

On the other hand, when government deposits in any one fiscal year do not decline as expected at the beginning of that year, the annual budget will end up with a fiscal surplus. These excess funds will no longer belong to that fiscal year, but can be considered for future years, and the government deposits with SAMA will be higher than before. In this case, the fiscal surplus has a contractionary effect on the monetary base in the sense that currency in the hands of the public will not rise as anticipated.

Reserves and Other Liabilities. The two remaining negative sources of the monetary base are the reserves account and other liabilities. The reserves account represents SAMA's capital; it was small and remained almost constant during the period under study. On the other hand, the figure resulting from the other liabilities of SAMA grew more than eleven-fold during the period of study and had a

negative effect on the monetary base. The pension-fund deposits with SAMA are among these other liabilities.

#### Uses of the Monetary Base

Analysis of the monetary base (B) in terms of uses reveals that currency held by the public is the dominant item. Although the amount of this currency grew about four-fold, its proportion of the monetary base had declined from eighty-one percent in Zul-Hijjah 1385 (April 1966) to sixty-eight percent in Zul-Hijjah 1394 (January 1975).

Commercial banks' deposits, the second most important use of the monetary base, reached a proportion of twenty-seven percent of the base money in Zul-Hijjah 1394 (January 1975) from a level of twelve percent in Zul-Hijjah 1385 (April 1966). These deposits consist of the statutory reserves of commercial banks and the excess reserves which are used as working reserves for clearing and collecting of checks.

The third use, notes held by commercial banks, which represents the amount of cash that banks hold in their portfolios, had increased by two-hundred-and-thirty-one percent during the period of study.

#### The Money Supply Multiplier

The size of the money stock associated with any given level of base money depends on the following factors: how the public chooses to allocate wealth between currency and demand deposits (summarized in the  $k$  ratio), what proportions of bank deposits the public allocates to

time and demand deposits (summarized in the  $t$  ratio), the banks' demands for required and excess reserves in relation to the public's deposits (summarized in the  $r$  and  $e$  ratios, respectively).<sup>6</sup> These ratios constitute the proximate determinants of the money multiplier ( $m$ ), as expressed by the following relationship:

$$m = \frac{1 + k}{(r + e)(1 + t) + k}$$

The money supply multiplier summarizes all factors other than the growth of the money base which operate to affect the money stock.

According to Burger's scheme, the money stock ( $M$ ) is a product of the monetary base ( $B$ ) and the money supply multiplier ( $m$ ).<sup>7</sup> From this relationship we obtain:

$$m = \frac{M}{B}$$

Since  $M = C_p + D_D$

where  $C_p$  = currency held by the public

and  $D_D$  = demand deposits held by the public

and  $B = R + C_p$

$$\text{then } m = \frac{C_p + D_D}{R + C_p}$$

Since  $R = A(D_D + T) + C_p$

where  $A$  = actual fraction of reserves

and  $T$  = time deposits held by the public

$$\text{then } m = \frac{C_p + D_D}{A(D_D + T) + C_p}$$

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<sup>6</sup>Robert E. Weintraub, Introduction to Monetary Economics (New York: The Roland Press, 1970), pp. 132-135.

<sup>7</sup>Burger, p. 4.

When we divide every expression by  $D_D$ , we obtain

$$\frac{\frac{C_P}{D_D} + \frac{D_D}{D_D}}{A \left( \frac{D_D}{D_D} + \frac{T}{D_D} \right) + \frac{C_P}{D_D}} = \frac{1 + \frac{C_P}{D_D}}{A \left( \frac{(1+T)}{D_D} \right) + \frac{C_P}{D_D}}$$

By definition,

$$A = r + e \quad \frac{C_P}{D_D} = k \quad \frac{T}{D_D} = t$$

hence, we obtain

$$m = \frac{1 + k}{(r + e)(1 + t) + k}$$

This formulation of the money multiplier will be used to isolate the relative contribution of each of the components of the multiplier to the growth rate of money.

In addition, we may consider the money supply in terms of its narrow and broad definitions (expressed as  $M_1$  and  $M_2$  respectively) and similarly derive formulas for the corresponding money multipliers ( $m_1$  and  $m_2$ ). Thus, to find the money-supply multiplier for  $M_2$ , we need only substitute the expression " $C_p + D_D + T$ " for the numerator in steps two and three above, and then follow the same process. Thus we obtain

$$m = \frac{1 + k + t}{(r + e)(1 + t) + k}$$

The factors that can cause changes in the money multipliers  $m_1$  and  $m_2$  are all of the factors which influence the money-multiplier ratios; that is, the currency ratio ( $k$ ), the time-deposit ratio ( $t$ ), the required reserve ratio ( $r$ ), and the excess reserve ratio ( $e$ ).

The total contribution of all of the components of the money supply multiplier equals the contribution of the multiplier to the growth of the money stock. In the following discussion we will explore each of the above-mentioned ratios, investigating the factors which influence them and the effects of these factors on the multiplier (m) and the money supply (M).

#### The Currency-demand Deposit Ratio (k)

The following relationship describes the public's allocation of wealth between currency and demand deposits:

$$k = \frac{C_p}{D_D}$$

where k is the currency-demand deposit ratio,  $C_p$  is the currency held by the public, and  $D_D$  is the demand deposits held by the public. Computing the currency ratio (k) in this manner will enable us to determine whether the habit of using checks in payment vis-a-vis currency has tended to gain in importance in Saudi Arabia during the period of study.

Table 3 shows the composition of the money supply and the level of growth attained at the end of the Hegira calendar year and the corresponding Gregorian date. The money supply ( $M_1$ ) grew from S.R. 1632 million in Zul-Hijjah 1385 (April 1966) to S.R. 7784 million in Zul-Hijjah 1394 (January 1975), recording an increase of 377 percent. Although currency held by the public rose almost four-fold, from S.R. 1062 million to S.R. 4073 million, its proportion of  $M_1$  declined from



TABLE 3  
MONEY SUPPLY IN SAUDI ARABIA  
(Millions S.R.)

DATE		CURRENCY OUTSIDE BANKS	RC	DEMAND DEPOSITS	RD	M <sub>1</sub>	PER- CENT CHANGE	TIME & SAVINGS DEPOSITS	RT	M <sub>2</sub>	PER- CENT CHANGE
HEGIRA	GREGORIAN										
29-12-85	20-4-66	1062	65.1	570	34.9	1632		116	6.6	1748	
							15.6				18.4
30-12-86	10-4-67	1219	64.6	667	35.4	1886		183	8.8	2069	
							12.9				15.0
30-12-87	29-3-68	1370	64.3	759	35.7	2129		251	10.6	2380	
							6.6				10.2
29-12-88	18-3-69	1466	64.6	804	35.4	2270		353	13.5	2623	
							6.0				7.4
29-12-89	7-3-70	1567	65.1	839	34.9	2406		410	14.6	2816	
							4.9				9.6
29-12-90	25-2-71	1656	65.6	868	34.4	2524		561	18.2	3085	
							10.7				14.2
30-12-91	15-2-72	1788	64.0	1006	36.0	2794		730	20.7	3524	
							34.6				30.9
30-12-92	3-2-73	2296	61.1	1465	38.9	3761		851	18.5	4612	
							39.7				31.3
30-12-93	23-1-74	2943	56.0	2311	44.0	5254		801	13.2	6055	
							48.2				47.1
30-12-94	12-1-75	4073	52.3	3711	47.7	7784		1121	12.6	8905	

M<sub>1</sub> = the money supply in its narrow definition

M<sub>2</sub> = the money supply in its broad definition

RC = the ratio of currency outside banks to M<sub>1</sub>

RD = the ratio of demand deposits to M<sub>1</sub>

RT = the ratio of time and savings deposits to M<sub>2</sub>

SOURCE: Saudi Arabian Monetary Agency, Annual Report 1395 A.H. (1975) (Jeddah, Saudi Arabia: Saudi Arabian Monetary Agency, 1975), pp. 92-99.

65.1 percent in Zul-Hijjah 1385 (April 1966) to 52.3 percent in Zul-Hijjah 1394 (January 1975). During this same period, the proportion in demand deposits jumped from 34.9 percent to 47.7 percent, which is almost half of  $M_1$ , indicating the increasing public preference for using checks and dealing with banks.

Social and economic trends, availability of bank facilities, preferences for liquidity and safety, and personal income are all factors that affect the behavior of the  $k$  ratio.<sup>8</sup> We shall explore these factors and their corresponding effects, but the discussion is necessarily tentative and qualitative due to incomplete data. Data that would have enabled us to judge quantitatively the significance of these factors were unavailable.

Social and Economic Trends. A nation's social and economic trends will have an effect in shaping aggregate currency demand. In other words, as a country shows greater social and economic development the public becomes better acquainted with banking practices. Such familiarization encourages carrying out monthly transactions through bank checking accounts, and therefore serves to decrease the  $k$  ratio.

Social and economic developments in Saudi Arabia can be measured by the progress achieved in fields like education, transportation and communication. For example, the number of students attending colleges and universities increased from 2,800 in 1384-85 (1964-65) to 14,872 in 1393-94 (1973-74), registering an increase

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<sup>8</sup>Weintraub, pp. 136-160.

of 431 percent.<sup>9</sup> Students at this level of education appreciate the greater availability of banking services and recognize its role in the economy. In regard to transportation and communication developments, the length of roads constructed rose from 1176 kilometers in 1384-85 (1964-65) to 17,679 kilometers in 1393-94 (1973-74), and the number of telephones reached 93,600 units by the end of 1393-94 (1973-74) from a level of 20,000 in 1385-86 (1965-66).<sup>10</sup> Improvements in the means of transportation and communication correspond to a greater public demand for banking services and a greater use of deposits in place of currency; the k ratio will decrease as a result of such developments.

Availability of Bank Facilities. The availability of banking facilities also has an effect on the k ratio. The higher the number of bank branches and offices, the larger the number of deposits. This will lead to a decrease in the k ratio.

During the period of study, only two new commercial banks were established in Saudi Arabia. However, of greater significance is the increased number of branches and offices in operation, which rose from forty-eight in 1384-85 (1964-65) to eighty-three in 1393-94 (1973-74).<sup>11</sup> Banking services are now provided in thirty-three cities, covering all regions of the country.<sup>12</sup> The spread of banking facilities tends to

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<sup>9</sup>SAMA, Annual Reports 1385-86 A.H. and 1395 A.H. (1965-66 and 1975), p. 17 and p. 69, respectively.

<sup>10</sup>Ibid.

<sup>11</sup>Ibid.

<sup>12</sup>Ibid.

encourage the use of demand deposits in place of currency, and this practice tends to decrease the  $k$  ratio.

Preference for Liquidity and Safety. A strong motive for holding currency in place of demand deposits is the desire for safety and liquidity. Money in the pocket or in home vaults can be used without hesitation, and many people consider their money safer there than in banks. Moreover, the fear that banks will suspend honoring demand deposit liabilities can often lead to a reduction in the use of demand deposits, which consequently increases the  $k$  ratio.

In Saudi Arabia, however, the people hesitate to deal with banks, primarily for religious reasons. The Islamic religion prohibits transactions involving interest charges. Since banks charge interest on loans and credits granted, and hence pay interest on their deposit liabilities, the Saudis prefer to carry out their transactions with currency to avoid breaking a religious rule. This preference for currency tends to raise the  $k$  ratio.

Income. An individual's willingness to use checks depends on his income--the ability to absorb the costs of demand deposits rises as income decreases. Thus,  $k$  is related inversely to income. When personal income rises, the  $k$  ratio declines, and vice versa.

Since data on personal income in Saudi Arabia is unavailable, we will use the Gross Domestic Product (GDP) as an approximate measure of income. Table 4 reveals that continuous high growth of GDP during the period of study corresponds with a decline in the  $k$  ratio over

TABLE 4  
GROSS DOMESTIC PRODUCT  
AND THE CURRENCY AND TIME-DEPOSITS RATIOS

HEGIRA	GREGORIAN	GROSS DOMESTIC PRODUCT (S.R. Million)	PERCENT CHANGE	HEGIRA	GREGORIAN	CURRENCY RATIO	TIME- DEPOSITS RATIO
1385-86	1966	12,004.2		29-6-86	14-10-66	1.78	.24
1386-87	1967	13,142.5	9.5	30-6-87	3-10-67	1.77	.28
1387-88	1968	14,656.6	11.5	29-6-88	22-9-68	1.86	.39
1388-89	1969	15,975.3	9.0	29-6-89	11-9-69	1.80	.47
1389-90	1970	17,398.6	8.9	29-6-90	1-9-70	1.88	.59
1390-91	1971	22,921.2	31.7	29-6-91	21-8-71	1.70	.58
1391-92	1972	28,257.3	23.3	29-6-92	9-8-72	1.49	.56
1392-93	1973	40,551.1	43.5	29-6-93	29-7-73	1.10	.36
1393-94	1974	100,964.6	149.0	29-6-94	19-7-74	1.06	.29

SOURCE: Saudi Arabian Monetary Agency, Annual Reports 1391-92, 1392-93, and 1395 A.H. (1972, 1973, and 1975) (Jeddah, Saudi Arabia: Saudi Arabian Monetary Agency, 1972, 1973, 1975), pp. 106-107, 112-113, 130-131, respectively.

time. When GDP grew from S.R. 15,975.3 million in 1388-89 (1968-69) to S.R. 17,398.6 million in 1389-90 (1969-70), recording a moderate growth of 8.9 percent, the k ratio rose from 1.80 in 12-6-1389 (September 1969) to 1.88 in 12-6-1390 (September 1970). Conversely, the k ratio declined from 1.88 in 12-6-1390 to 1.70 in 12-6-1391 (August 1971), while GDP increased by 31.7 percent, from S.R. 17,398.6 million in 1389-90 (1969-70) to the level of S.R. 22,921.2 million in 1390-91 (1970-71). Thus, we can reach a provisional conclusion that the growth of income in Saudi Arabia has a negative effect on the k ratio.

How the various factors underlying the k ratio affect the size of the monetary supply (M) can be logically deduced from the following identities:<sup>13</sup>

$$M = Bm \quad (1)$$

$$m = \frac{1 + k}{(r + e)(1 + t) + k} \quad (2)$$

Using the symbol  $\Delta$  to stand for a "change in," we have from equation (1) the difference operator

$$\Delta M = m\Delta B + B\Delta m + \Delta B\Delta m$$

Setting  $B = 0$ , we have

$$\Delta M = B\Delta m$$

Thus, any event that increases m will tend to increase M, and any event that decreases m will tend to decrease M.

In equation (2) above, the k ratio acts as a constraint in the money supply process. The higher the k ratio, the lower the level of M

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<sup>13</sup>Weintraub, pp. 136-160.

associated with any given level of B. Thus, by the quotient rule of differentiation, increases in the k ratio will cause m to fall, and conversely, decreases in the k ratio will cause m to rise as long as the value of the numerator in equation (2) is greater than the value of the denominator.

#### The Time-deposit Ratio (t)

The relationship which exists between the portion of its bank deposits the public allocates to demand deposits and the portion it allocates to time deposits can be described as follows:

$$t = \frac{T}{D_D}$$

where t is the time-deposit ratio, T is the time deposits held by the public, and  $D_D$  is the demand deposits held by the public.

As Table 3 illustrates, time and savings deposits grew remarkably in the first eight years of the period under study; declined by 5.9 percent in 1393 (1973); then recovered its growth, recording an increase of 40.0 percent in the last year. The ratio of time and savings deposits to money supply ( $M_2$ ) rose from 8.8 percent in Zul-Hijjah 1385 (April 1966) to its highest level of 20.7 percent in Zul-Hijjah 1391 (February 1972). Then it descended to 12.6 percent in Zul-Hijjah 1394 (January 1975). The decrease in the ratio of time and savings deposits is due to the low yield on savings accounts relative to other forms of investments such as commodity trading and real estate speculation.

Although the value of  $M_2$  steadily increased over time during the period under study, the percent of change from year to year varied considerably: In the first three years,  $M_2$  rose by 10.4, 18.4, and 15.0 percent, respectively; during the following three years, the percent of change slackened to 10.2, 7.4, and 9.6, respectively; and the last four years indicated increases of 14.2, 30.9, 31.3, and 47.1 percent, respectively.

The  $t$  ratio is influenced by income. Increases in income tend to raise the public's holdings of time deposits relative to demand deposits, thereby raising the  $t$  ratio. We can presume, then, that the steady growth of income (GDP) in Saudi Arabia is responsible in part for the expansion in the time and savings deposits and the rise in the  $t$  ratio throughout the period of study.

The effects on  $M$  of the factors shaping the  $t$  ratio can be deduced from the following two money supply identities:

$$M = Bm \quad (1)$$

$$m = \frac{1 + k}{(r + e)(1 + t) + k} \quad (2)$$

From equation (2), it is apparent that changes in the  $t$  ratio will instantaneously cause changes of the opposite sign in  $m$ . Since any event that increases (decreases)  $m$  will tend to increase (decrease)  $M$ , any changes in the  $t$  ratio will cause changes of the opposite direction in  $M$ . Thus, if the  $t$  ratio rises (falls) as a consequence of income increases (decreases), money stock declines (expands).



### The Required Reserve Ratio (r)

The required reserve ratio (r) can be computed by dividing total required reserves (R) by the public's deposit claims ( $D_D + T$ ); that is,

$$r = \frac{R}{D_D + T}$$

This equation describes the bank's behavior in relation to its holdings of reserves against the public's deposits.

The factors that cause changes in the r ratio in Saudi Arabia are statutory changes in the reserve requirements against demand and time deposits and transfers of funds between the public and the government.

The reserve requirements in Saudi Arabia in 1381 (1961) were ten percent of commercial banks' total deposit liabilities.<sup>14</sup> These requirements remained constant until Safar 1386 (June 1966), when a new banking-control law was enacted. According to this law, commercial banks were required to maintain with SAMA at all times a statutory deposit of a sum not less than fifteen percent of its deposit liabilities.<sup>15</sup> This law gave SAMA the right to increase the aforementioned percentage to a maximum of 17.5 percent, or reduce it to a minimum of ten percent.<sup>16</sup> This statutory deposit of fifteen percent was divided

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<sup>14</sup>SAMA, Annual Report 1381-82 A.H. (1961-62), p. 20.

<sup>15</sup>"Banking Control Law," Royal Decree No. M/5 (Jeddah, Saudi Arabia: Saudi Arabian Government Printing Office, 1966), p. 7.

<sup>16</sup>Ibid.

by SAMA into a required reserve of ten percent on demand deposits and five percent on time and savings deposits.<sup>17</sup>

Since the introduction of the banking-control law, the reserve requirements against demand and time deposits remained stable until the end of the period under study. SAMA's right to raise or lessen the reserve requirements on demand and time deposits within certain limits has its effect on the  $r$  ratio. When SAMA raises the required rates, the  $r$  ratio goes up; on the other hand, when the required rates are reduced, the  $r$  ratio declines.

Transfers of funds between the public and the government occur as a result of manipulating government accounts between SAMA and commercial banks to reinforce the latter's liquidity position. This is made possible by transferring some government deposits from SAMA's banking departments to these commercial banks. For example, in 1382 (1962), SAMA transferred S.R. 25 million of government deposits to certain commercial banks in order to provide these banks with primary reserves and enable them to cope with the increasing demand for credit.<sup>18</sup> Actions of this nature increase government demand deposits with commercial banks, and thus cause an increase in the required reserve ratio ( $r$ ).

In their relationships to the monetary-supply multiplier ( $m$ ), the factors determining the required reserve ratio ( $r$ ) also affect the money stock ( $M$ ). Changes in the reserve requirements against demand

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<sup>17</sup>SAMA, Statistical Summary 1394-95 A.H. (1974-75), p. 31.

<sup>18</sup>SAMA, Annual Report 1381-82 A.H. (1961-62), p. 19.

and time deposits cause opposite changes in  $m$ , and hence in  $M$ . When the legal reserve requirement ratios are increased, banks that do not have sufficient reserves are forced to liquidate assets or borrow. This puts pressure upon the banking system to reduce its total loan and investments and thereby contract the stock of money ( $M$ ). Decreases in reserve requirements against demand and time deposits permit the banking system to expand loans and investments, and hence tend to increase  $M$ . Thus, changes in the  $r$  ratio which originate from transfers of funds between the public and the government affect  $m$  and  $M$  in precisely the same way as those resulting from statutory changes in reserve requirements: Transfers of funds into government accounts at SAMA decrease  $m$  and hence  $M$ , while transfers from government deposits to demand deposits at commercial banks increase  $m$  and  $M$ .

#### The Excess Reserve Ratio ( $e$ )

Excess reserves are defined as reserves held in excess of what is legally required. The excess reserve ratio ( $e$ ) can be computed by dividing total excess reserves ( $R^e$ ) by the public's demand deposits ( $D_D$ ) plus time deposits ( $T$ ); that is,

$$e = \frac{R^e}{D_D + T}$$

The stringency of bank examiners and the existence and operation of clearinghouses are the forces which shape the excess reserve ratio.

Bank preferences for excess reserves, which are non-earning assets, depend on whether their loans and investments are being closely examined by regulatory critics who have the power to impose stiff

penalties on banks that take risks. Article Six of the Banking Control Law contributes to the rise of excess reserves by stating that

the deposits liabilities of a bank shall not exceed fifteen times its reserves and paid-up or invested capital. If the deposit liabilities exceed this limit, the bank must within one month of the date of submission of the statement referred to in para. 1 of Article 15, either increase its capital and reserves to the prescribed limit or deposit fifty percent of the excess with the Agency.<sup>19</sup>

Article Eight sets the limits on investments and loan of the commercial banks in Saudi Arabia by stating that

No bank shall grant a loan or extend a credit facility or give a guarantee or incur any other financial liability with respect to any natural or juristic person for amounts aggregating more than 25 percent of the Bank's reserves and paid-up or invested capital. The Agency may, in the public interest and subject to such conditions as it may impose, increase this percentage up to 50 percent.<sup>20</sup>

These two articles, then, supervise commercial banks in their management of the two basic items of their balance sheets, and grant SAMA the authority to regulate and control the commercial banking system in Saudi Arabia.

Commercial banks' deposits with SAMA increased substantially. This is largely due to the huge expenditures needed for development projects, which increased the banks' need for deposits with SAMA (to facilitate business transactions) and increased the need for greater amounts of reserve deposits. Consequently, from the preceding discussion, we can assume that the regulatory authority rules and their

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<sup>19</sup>"Banking Control Law," pp. 6-7.

<sup>20</sup>Ibid., p. 7.

critical examinations induce banks to increase their excess reserves. This increase will, accordingly, raise the e ratio.

With the establishment of the three clearinghouses in Saudi Arabia, commercial banks began to settle their accounts through manipulation of excess reserves instead of through cash payments. The number of checks cleared in all three clearinghouses grew from 222,827 in 1389 (1969) to 569,970 in 1394 (1974), reflecting an increase of 155.8 percent.<sup>21</sup> During this same period, the value of cleared checks rose by 494.8 percent, from S.R. 3,272 million to S.R. 19,461 million.<sup>22</sup>

Commercial banks put aside a large amount of their reserves with SAMA as excess reserves for clearing and settling their payments with each other. Thus, the increased use of checks in settling payments between commercial banks may have been one of the causes that influenced the upward trend in the e ratio.

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<sup>21</sup>SAMA, Annual Report 1395 A.H. (1975), p. 108.

<sup>22</sup>Ibid.

## CHAPTER 4

### THE ANALYSIS

The money stock (M) was defined in Chapter 3 as the product of the monetary base (B) and the money multiplier (m). We have discussed the essential elements of this equation and have examined the monetary base and the money supply multiplier as they affect the money stock in Saudi Arabia. Also, the constituents of the base money in Saudi Arabia and the proximate determinants of the money multiplier were set forth. On this basis we can break this equation as follows:

$$\frac{\Delta M}{M} = \frac{m(\Delta B_1 + \Delta B_2 + \Delta B_3 + \dots + \Delta B_8)}{M} + \frac{B(\Delta k + \Delta t + \Delta r + \Delta e)}{M}$$

In this chapter we are going to investigate the sources of change in the Saudi Arabian money stock (M) for the period 1385 (1965) to mid-1395 (1975). In pursuing this investigation it will be useful to note the role played by the major components of the money base (B) (i.e., foreign exchange, investments, and government accounts) and the role played by the forces shaping the money supply multiplier (m) via changes in its proximate determinants (i.e., k, t, r, and e).

Chapter 4 is divided into four sections: the first examines the behavior of the two main factors that influence the money supply process. The second section analyzes the components of the monetary base, and the third section analyzes the determinants of the money

multiplier. In the fourth section, we will determine whether this behavior is subject to seasonal patterns.

### Behavior of the Determinants of Money Supply

The money supply (M) recorded an average monthly variation rate (expressed as annual rate) of 19.63 percent and a standard deviation of 47.68 percent, as shown in Table 5. Looking at Table 6 we can make three observations: (1) The monthly variations of M fluctuate with high percentage points. (2) Throughout the period of study the monthly variations in the first half of the year do not show clear behavior. In some years there was an increase, while in others there was a decline for the same month. However, in the second half of the year there is a certain pattern, with an increase in the sixth, eighth, ninth and eleventh months, and a decline in the seventh and tenth months of the year. (3) The highest rates of increase occurred in the eleventh month, while the highest rate of decline occurred in the seventh month of the year. These results reflect the behavior of the source of M, that is B and m. In this section we will first study the monetary base (B) and then we will deal with the money supply multiplier (m).

It was shown in Chapter 3 that the actions of the monetary authorities determine the size of the base money supplied to the private sector of the economy. The growth of the monetary base in Saudi Arabia is determined primarily by SAMA's holdings of foreign exchange, gold, investments in foreign bonds, and government deposits.

TABLE 5

THE AVERAGE MONTHLY CHANGE (EXPRESSED AS ANNUAL RATE) OF THE  
MONEY SUPPLY, MONETARY BASE, AND MONEY SUPPLY MULTIPLIER  
1385 TO MID-1395 A. H. (1965 TO MID-1975)\*

	MEAN (%)	STANDARD DEVIATION (%)
Money Supply (M)	19.63	47.68
Monetary Base (B)	21.02	63.95
Money Supply Multiplier (m)	- .75	40.33

\*NOTE: The statistics in this table were calculated according to the following formulas:

$$\Delta M = \frac{\Delta M}{M} \times 12$$

where M = money supply

$\Delta M$  = change in money supply

$$\Delta B = \frac{m \Delta B}{B} \times 12$$

B = monetary base

$\Delta B$  = change in monetary base

$$\Delta m = \frac{B \Delta m}{m} \times 12$$

m = money supply multiplier

$\Delta m$  = change in money supply multiplier



TABLE 6

MONEY SUPPLY MONTHLY PERCENTAGE CHANGE ON AN ANNUAL RATE  
1385-95 A.H. (1965-75)

Year*	△ 1-2	△ 2-3	△ 3-4	△ 4-5	△ 5-6	△ 6-7	△ 7-8	△ 8-9	△ 9-10	△ 10-11	△ 11-12	△ 12-1
1385	- 3.16	-18.21	-12.86	- 6.50	+ 38.39	-46.70	+28.83	+ 79.62	-21.87	+100.64	-43.24	+33.09
1386	+16.46	-24.00	00.00	+15.13	+ 25.61	-21.59	+90.07	+ 5.94	-28.88	+ 90.13	-20.02	+ 8.27
1387	+36.02	- 4.29	-11.70	+11.81	- 4.31	-30.28	+15.21	+101.41	-45.02	+ 63.57	+12.53	- 1.69
1388	+ 8.47	+ 3.36	-20.12	-13.64	+ 15.52	-40.87	+29.97	+ 60.77	-68.76	+105.93	+ 7.45	+19.03
1389	00.00	+ 8.85	-35.64	-15.97	+ 19.96	-35.56	+20.78	+ 46.77	-31.05	+ 66.40	+11.07	-10.47
1390	-19.62	+12.79	-13.67	- 8.19	+ 6.19	-58.46	+25.34	+ 67.58	-48.98	+ 93.79	+19.81	+18.07
1391	-29.04	- 5.28	+17.84	-19.00	+ 59.86	-37.24	+38.43	+ 37.24	-20.51	+ 87.11	-17.77	+31.77
1392	+35.13	+27.23	+11.13	+ 3.94	+ 79.27	-62.58	+54.37	+ 69.85	-27.38	+158.08	- 6.03	+39.88
1393	+23.47	+13.33	+43.73	+72.83	+ 93.46	-77.10	+25.12	+ 82.82	-13.86	+116.44	- 0.68	+35.40
1394	+16.42	+78.57	-18.90	+94.96	+ 70.59	-69.22	- 2.52	+ 84.30	+11.98	+133.51	+58.70	+77.85
1395	+65.00	+11.26	+10.20	+49.78	+183.94							

\*See Appendix A for conversion of Hegira year to Gregorian year.

As can be seen from Table 5, the average contribution of the monetary base (B) was 21.02 percent on an annual rate, while its standard deviation was 63.95 percent. The behavior of the monetary base in Saudi Arabia from 1385 A.H. (1965) to mid-1395 A.H. (1975) is illustrated in Figure 1. Three facts are evident during this period: (1) the base has tended to rise secularly; (2) the base has been subject to short-term variations during the growth period; (3) there is a strong resemblance between the behavior of the base (B) and the money supply (M).

There are four major factors which account for the behavior of Saudi Arabia's monetary base: (1) oil production and revenues; (2) governmental expenditures with the projects portion constituting the major part; (3) the annual Haj (pilgrimage) season; (4) the month of Ramadan (fasting) culminating in the Muslim festival of Eid-al-Fitr. Since the peak of activity related to each of these four factors occurs in a different month, it would be more advantageous to examine each in relation to movements of the sources of the monetary base.

The money multiplier was defined and formulated in Chapter 3. The money supply multiplier has a negative effect of .75 percent on the money supply and a standard deviation of 40.33 percent, as indicated in Table 5. From Table 7 we can make the following observation about the value of the money multiplier in Saudi Arabia: the value of the monetary multiplier is variable in the short run. The monthly percentage fluctuations vary within a reasonable range in general, except for the last three years. Throughout the period of study, we can see that the multiplier goes up in the first, fourth, seventh, and eighth months,

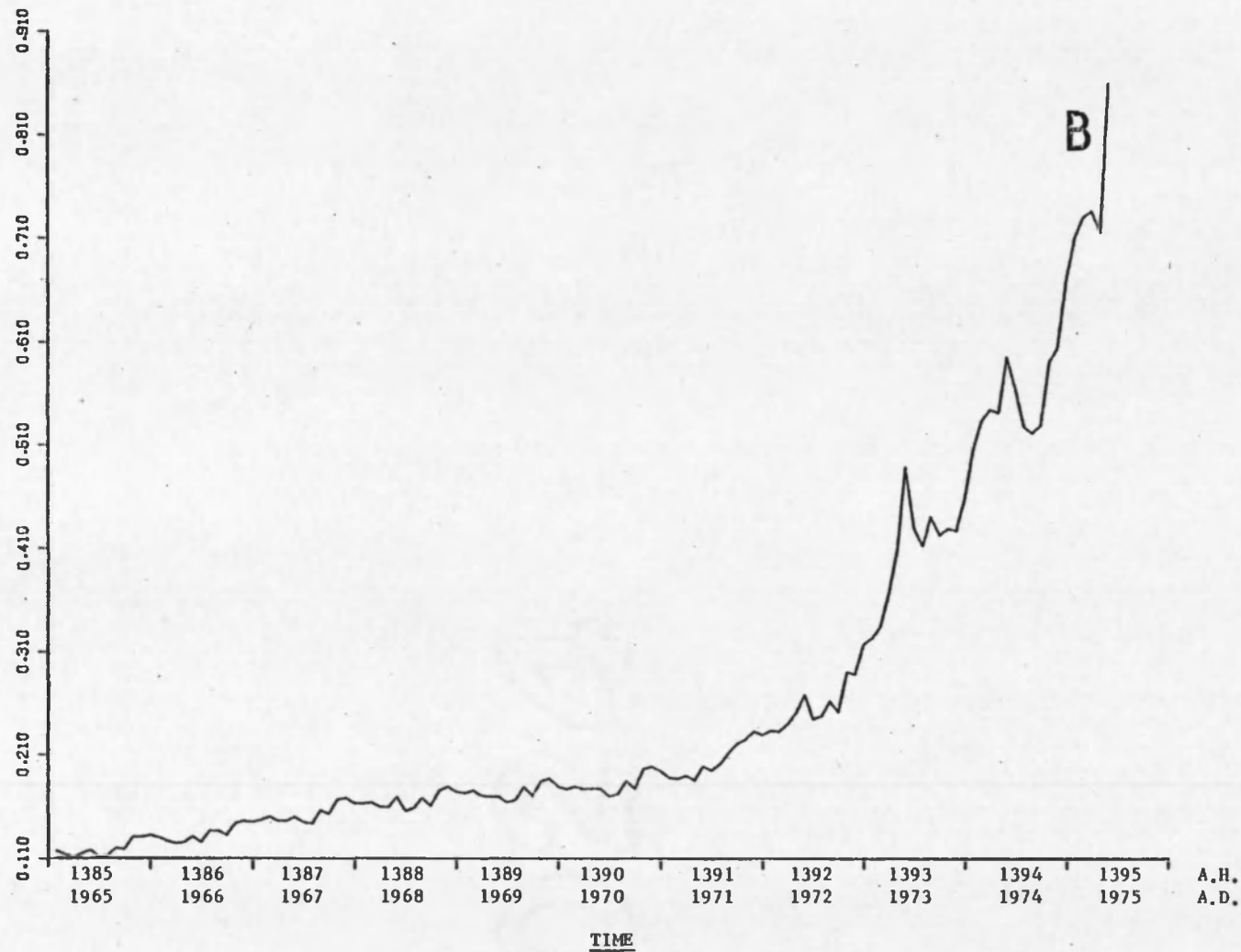


Fig. 1. Trend of the Monetary Base  
(Millions S.R.)

TABLE 7

MONEY SUPPLY MULTIPLIER MONTHLY PERCENTAGE CHANGE ON AN ANNUAL RATE  
1385-95 A.H. (1965-75)

Year *	△ 1-2	△ 2-3	△ 3-4	△ 4-5	△ 5-6	△ 6-7	△ 7-8	△ 8-9	△ 9-10	△ 10-11	△ 11-12	△ 12-1
1385	- 22.14	+ 8.38	+ 17.31	-44.74	+ 7.19	+17.16	+14.42	+ 2.23	-11.87	-20.62	-41.43	+20.39
1386	+ 32.27	+ 7.22	+ 23.23	+ 3.53	- 27.27	+31.37	-14.36	+ 4.24	+ 6.25	-14.97	-34.87	+15.45
1387	+ 17.98	-26.16	+ 18.54	+11.73	- 32.25	+10.01	+25.29	- 3.74	-20.62	-46.38	+ 4.26	+33.02
1388	+ 8.31	- 1.08	+ 9.95	-11.62	- 58.73	+58.06	+ 7.36	-11.88	-14.46	- 3.84	-17.05	+52.29
1389	+ 7.57	- 7.08	- 0.51	-12.64	+ 19.98	+ 3.53	+ 1.06	-41.66	+24.27	-30.96	- 3.73	+128.09
1390	-107.18	- 5.54	+ 5.11	-11.77	+ 6.15	- 9.45	+ 7.29	-19.81	+ 1.08	-37.19	+ 8.20	+39.64
1391	+ 13.88	- 4.73	+ 2.63	+11.49	- 21.22	-15.88	+ 1.88	-26.13	-66.68	+64.86	-56.04	+46.18
1392	+ 13.39	+96.36	-107.41	-50.91	+ 0.92	+50.73	+36.85	+ 1.30	+19.02	-23.53	+ 1.88	-71.97
1393	- 1.65	-25.41	- 67.56	-56.39	-111.07	+78.82	+69.73	+ 1.46	+31.64	+99.78	+ 3.84	-49.89
1394	-113.96	+13.37	- 3.53	+59.03	- 38.88	- 8.91	+80.68	+95.46	- 5.08	- 7.14	+26.57	-46.57
1395	- 8.68	-21.23	+ 28.13	+53.74	- 39.02							

\*See Appendix A for conversion of Hegira year to Gregorian year.

goes down in the third and eleventh months and fluctuates for the remaining months of the year. We can see an opposite pattern of behavior in  $m_1$  in the third, fourth, seventh and eleventh months of the year in relationship to behavior of  $M_1$ .

### Monetary Base Components

In Chapter 3 we defined and discussed the positive and negative sources of the monetary base. Table 8 presents the average monthly contribution of each to the growth of the money supply for the period from 1385 A.H. (1965) to mid-1395 A.H. (1975). The mean value and standard deviation of each source contributing to the growth of the money stock are given.

Table 8 yields some interesting implications about the relative importance of these sources for the growth rate of money during the period under study. For example, the mean contribution of the foreign exchange holdings of SAMA was 135.22 percent annually throughout the period of study, revealing the great influence of this item on the growth of the monetary base. Foreign exchange is, in fact, the major positive determinant of the monetary base in Saudi Arabia. However, the standard deviation for foreign exchange contribution was 358.43 percent, which reflects the large monthly fluctuations this variable experienced during the period under study.

Variations in SAMA's holdings of foreign exchange are much higher than variations in either investments or gold--the two other

TABLE 8

THE AVERAGE MONTHLY CHANGE (EXPRESSED AS ANNUAL RATE)  
OF THE COMPONENTS OF THE MONETARY BASE  
1385 TO MID-1395 A.H. (1965 TO MID-1975)

	MEAN (%)	STANDARD DEVIATION (%)
Foreign Exchange	135.22	358.43
Investments	69.10	198.80
Gold	1.27	10.53
Other Assets	5.25	172.28
Reserves	- .03	.23
Government Current Accounts	- 13.71	863.01
Government Special Accounts	-123.00	839.86
Other Liabilities	- 57.20	227.63

Note: This table is based on the following formulas.

$$\Delta Fx = \frac{m\Delta B_{Fx}}{M} \times 12$$

$$\Delta R = \frac{m\Delta B_R}{M} \times 12$$

$$\Delta I = \frac{m\Delta B_I}{M} \times 12$$

$$\Delta GCA = \frac{m\Delta B_{GCA}}{M} \times 12$$

$$\Delta G = \frac{m\Delta B_G}{M} \times 12$$

$$\Delta GSA = \frac{m\Delta B_{GSA}}{M} \times 12$$

$$\Delta OA = \frac{m\Delta B_{OA}}{M} \times 12$$

$$\Delta OL = \frac{m\Delta B_{OL}}{M} \times 12$$

Where M=money supply; B=monetary base; m=money supply multiplier;  
Fx=Foreign exchange; I=Investment; G=Gold; OA=Other Assets;  
R=Reserves; GCA=Government Current Accounts; GSA=Government  
Special Accounts; OL=Other Liabilities.

major positive sources of the monetary base. Table 9 reveals three striking points: (1) the monthly changes of foreign exchange are very high, especially in the last few years of study; (2) the years 1385 (1965), 1386 (1966), 1391 (1971), 1393 (1973), and 1394 (1974) show a monthly increasing pattern; while the years 1387 (1967) and 1388 (1968) show monthly decreasing behavior; (3) the biggest rates of change are in the first, fourth, and ninth months and in the last quarter of each year; (4) the third, eleventh and twelfth months show a regular increasing trend throughout the period of study.

The monthly variations in foreign exchange holdings can be attributed to several factors: (1) oil production and revenues which reach peak level in the winter and slack off during the summer. The swings in oil output and revenues are believed mainly to reflect increased buying for stockbuilding, followed by reduced buying in the latter part of the year. Production levels are allowed to fluctuate in response to shifts in demand. Consequently, a relatively large part of the shifts in worldwide demand for oil is being reflected in Saudi Arabian oil production and export, and thus, revenues. (2) import orders which reduce foreign exchange holdings. In the third quarter of the Hegira year, especially in the seventh and eighth months, import orders are set to accommodate the needs of the fasting month of Ramadan (ninth month) and its Eid-al-Fitr festival. Import orders must also meet the needs that arise during the pilgrimage season. (3) the pilgrimage season reaches its peak during the eleventh month

TABLE 9

FOREIGN EXCHANGE MONTHLY PERCENTAGE CHANGE ON AN ANNUAL RATE  
1385-95 A.H. (1965-75)

Year #	Δ 1-2	Δ 2-3	Δ 3-4	Δ 4-5	Δ 5-6	Δ 6-7	Δ 7-8	Δ 8-9	Δ 9-10	Δ 10-11	Δ 11-12	Δ 12-1
1385	+175.58	+ 2.05	+ 8.37	+ 78.35	+ 26.02	+ 16.23	- 3.21	-126.04	+199.00	+ 9.03	+ 26.42	+149.66
1386	- 57.83	+ 11.92	-146.82	+ 9.60	+ 46.59	- 41.00	+ 5.72	+ 55.26	+ 28.91	+ 106.47	+249.62	+ 97.47
1387	- 98.90	- 48.75	+ 67.82	+ 51.57	- 51.57	-309.00	-902.69	+805.57	-101.41	+ 93.39	+187.16	-138.74
1388	- 41.20	- 49.29	- 39.58	- 41.35	+ 2.26	-166.77	+ 14.66	-185.60	-100.00	+ 214.85	+284.57	- 0.67
1389	-356.27	+215.40	-154.29	- 72.75	- 16.29	- 68.75	- 37.36	- 74.95	- 14.79	+ 0.71	+112.89	+108.86
1390	- 31.85	+ 58.50	+ 89.78	- 36.76	-128.96	- 15.61	- 13.45	+ 28.59	-235.32	+ 231.99	+359.20	+ 55.81
1391	+ 37.71	+ 84.57	+240.38	+223.42	+312.99	+267.74	+ 27.16	-127.54	+340.83	- 145.22	+270.17	+123.57
1392	+371.16	+175.70	+309.04	+272.80	+135.14	+277.79	+ 23.60	+ 31.09	+322.05	+ 302.50	+238.42	-277.05
1393	+426.43	+129.29	+205.04	-186.94	+718.24	+579.80	+ 97.59	-105.25	+202.87	+ 482.61	-298.95	+422.34
1394	+543.67	+545.58	+572.61	+697.39	+917.23	+770.38	+1152.13	-684.99	+1729.34	+1194.77	+342.57	+530.77
1395	+629.89	+892.64	+1005.77	+152.25	- 83.84							

\*See Appendix A for conversion of Hegira year to Gregorian year.



of the year. At this time most of the pilgrims have arrived and converted their foreign exchange into Saudi Riyals to cover their expenses.

In addition to the factors mentioned above, there are two other factors which have, in my opinion, a greater effect on these large variations in foreign exchange. The current Middle East crisis has its negative effect on the SAMA foreign exchange holdings in two ways. One is the halting of oil production and exports whenever there is a war breakout in that area. During the period under study, two wars occurred--in 1967 and 1973--resulting in a temporary cut in the flow of foreign exchange earnings to Saudi Arabia. The second negative effect of the Middle East crisis is Saudi Arabia's continuous annual payments of more than S.R. 630 million (U.S.\$ 140 million) to other Arab countries who were adversely affected by the 1387 (1967) and 1393 (1973) wars.<sup>1</sup>

Another important factor which has a positive effect on SAMA's foreign exchange holdings is the major new developments in the pricing of crude oil and in the financial arrangements between the government and the operating oil companies which took place in the 1970's. In the 1971-74 period a number of important agreements concerning the income tax and royalty rates as well as the posted prices of oil were reached. This resulted in significant increases in oil prices, and hence, in foreign exchange revenues.

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<sup>1</sup>SAMA, Annual Reports 1387 A.H. (1967) and 1395 A.H. (1975), p. 1 and p. 12.

Throughout the period of study, investments have exerted a positive influence on the growth of the money supply. According to Table 8 the relative influence of this factor was equal to 69.10 percent, while its standard deviation was 198.80 percent. Although these statistical results indicate that investments have a substantial effect on the stock of money, its variation was large as a consequence of the same developments that affected SAMA holdings of foreign exchange in the late sixties and early seventies. This figure shows that this item has a lower positive effect on the growth of the money stock.

As for the negative sources of the monetary base, we find that the Special and Current Government accounts had respective negative means of 13.71 and 123.00 percent monthly over the period of study. Combining the two accounts, it is shown that these government accounts bear substantial negative weight on the development of money supply in Saudi Arabia. The respective standard deviations of these two accounts were 836.01 and 839.86 percent monthly. These broad variations mirror the big shifts that government deposits at SAMA experienced. The cause of these big shifts is government expenditures and revenues, especially in the project sector which constitutes the major portion, and which tends to attain a normal level one or two months after the announcement of the budget in Rajab. Peak level is in the later months of the fiscal year, particularly in the last month (Jumad Al-thani).

Moreover, in the first five years of the period under study, governmental budgets included in their revenue side allocations from deposits at SAMA, causing a decline in the level of these deposits.

At the end of the fiscal years, surpluses of the budget are transferred to the Special and Current Government accounts, thus raising their levels. So, these changes in the level of deposits throughout the period produce fluctuations in the contribution of government deposits, which reflect its strong negative effect on the monetary base and on the money supply growth.

The other main negative source of the base is "Other Liabilities," which has a negative effect of 57.20 percent on the money supply (see Table 8). Its standard deviation of 227.63 percent indicates the broad shifts of this item from its average contribution to the growth of the money stock.

#### Money Supply Multiplier Determinants

The mean and standard deviation of each of the proximate determinants in the multiplier to the growth of money for the period under study are given in Table 10. The currency ratio (k) mean contribution was .45 percent, which indicates the little influence this ratio had on the growth of the money stock, while the standard deviation was 14.28 percent, reflecting a relative variation in the average contribution of the currency ratio to the money supply.

One of the main factors influencing the amount of money the banking system can create, given an increase in the monetary base, is the proportion of currency to demand deposits that the non-bank public desires to hold. Changes in the supply of base money by the monetary authority takes the form of both direct cash payments to the non-bank

TABLE 10

THE AVERAGE MONTHLY CHANGE ON A YEARLY BASIS  
OF THE COMPONENTS OF THE MONEY MULTIPLIER  
1385 TO MID-1395 A.H. (1965 TO MID-1975)\*

	MEAN (%)	STANDARD DEVIATION (%)
k ratio	.45	14.28
t ratio	.53	7.03
r ratio	-1.54	43.31
e ratio	- .59	11.09

\*NOTE: The statistics in this table are based on the following formulas:

$$\frac{B}{M} \frac{\partial m}{\partial k} \Delta k = \text{change in money supply growth due to change in k ratio}$$

$$\frac{B}{M} \frac{\partial m}{\partial t} \Delta t = \text{change in money supply growth due to change in t ratio}$$

$$\frac{B}{M} \frac{\partial m}{\partial r} \Delta r = \text{change in money supply growth due to change in r ratio}$$

$$\frac{B}{M} \frac{\partial m}{\partial e} \Delta e = \text{change in money supply growth due to change in e ratio}$$

Where M=money supply; B=monetary base; m=money supply multiplier; k=currency ratio; t=time deposit ratio; r=required reserve ratio; e=excess reserve ratio.

public and changes in the reserves of commercial banks. In fact, a major institutional feature of the Saudi Arabian monetary system is that the principal channel whereby the newly-created currency enters the hands of the non-bank public is direct cash payments by SAMA to various ministries (such as salaries and wages of the public civil servants). The institutional practice of direct cash payments by SAMA to various ministries is one of the main factors responsible for the rapid increase of currency in the hands of the non-bank public relative to demand deposits.

Whether the non-bank public in Saudi Arabia has held a fixed total amount of currency during the period under study can be determined by examining the currency-to-demand deposits ratio ( $k$ ). The trend of the  $k$  ratio is shown in Figure 2, which indicates a secular tendency in the behavior of this factor during the period under study. Demand deposits tended to rise during the period, but the absolute growth has not been fast enough to prevent currency from representing a secularly rising proportion of demand deposits. This phenomenon can be observed directly from the behavior of the  $k$  ratio as an indicator of the habit of using checks in payments, revealing that currency is still more widely used than demand deposits. Indeed, while the value of the  $k$  ratio has declined from 1.86 percent at the end of 1385 (1965) to 1.10 percent at the end of 1394 (1974), the non-bank public holdings of currency is still higher than demand deposits at the end of the study period. Figure 2 indicates another fact about the behavior of the  $k$

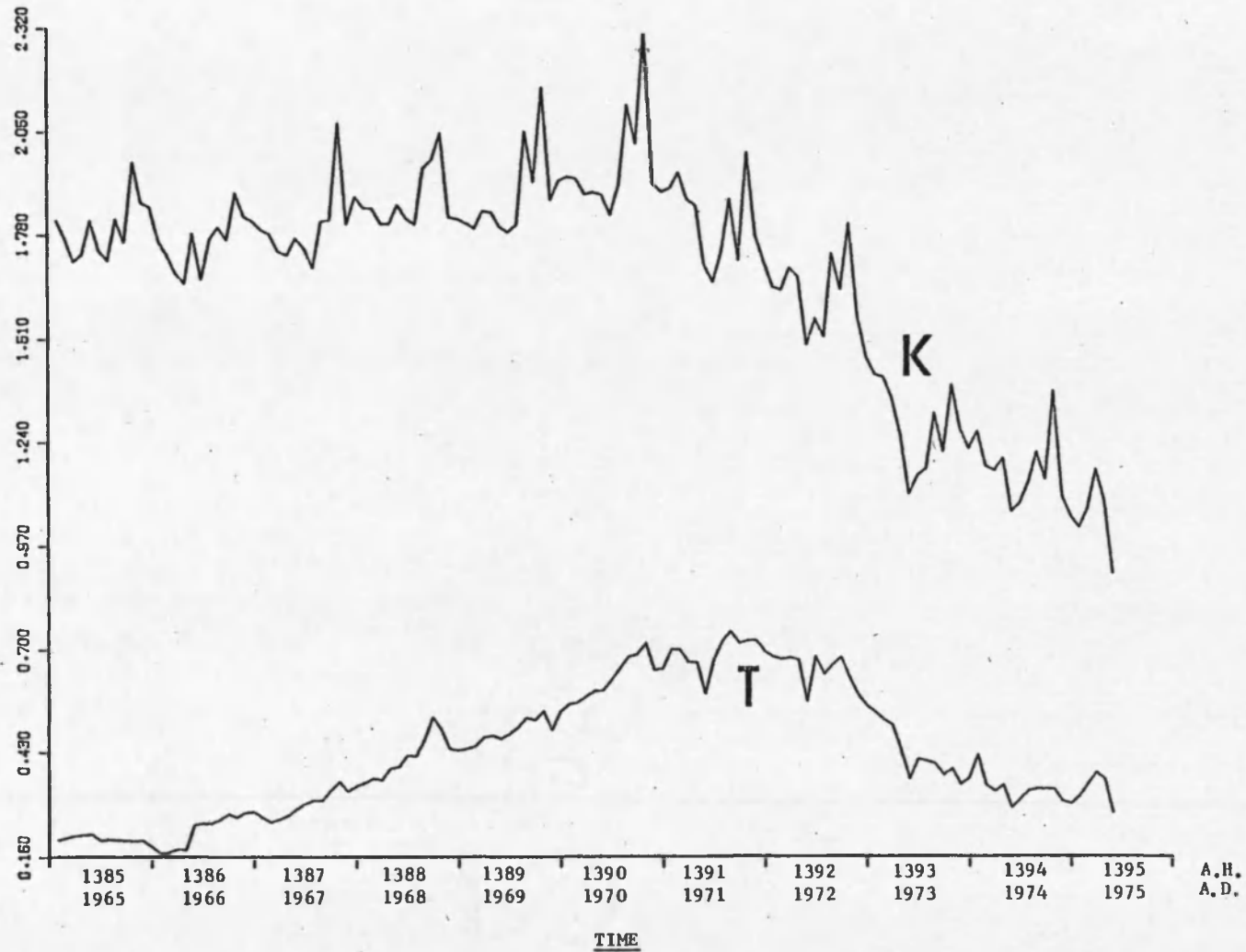


Fig. 2. Trend of the Currency and Time-deposit Ratios

ratio; namely, the existence of seasonal variations in the non-bank public's demand for currency.

The seasonal tendency of the non-bank public to demand more currency is mainly noticeable in the months of Ramadan and Zul-Quidah of each Hegira year. The rise in these two months is a direct result of the increase in economic activity which takes place in Saudi Arabia at this time. During Zul-Quidah, a peak of currency in circulation is reached when most of the pilgrims have arrived and converted their foreign exchange to Saudi Riyals to cover their expenses. Thus, there is a rise in the amount of currency in circulation. As the pilgrims begin to leave the country sometime after the middle of Zul-Hijjah, the currency in circulation gradually declines, but rises again for Jumad Al-thani when government payments increase. The currency in circulation reaches a trough in Rajab but starts to rise again in Sha'aban. It then reaches a second and relatively lower peak in Ramadan.

This seasonal increase in the non-bank public's demand for currency is mainly satisfied by increase in SAMA's note issues that takes place during these two months of each Hegira year. The pilgrimage season and the influx of pilgrims into Saudi Arabia lasts more than a month, but Zul-Quidah is chosen because it is during this month that the k ratio is at its highest level. In addition, the balance sheet of SAMA indicates clearly that SAMA's note issue is at its peak in the months of Ramadan and Zul-Quidah of each Hegira year.

Demand deposits present more or less the reverse situation as that presented by currency in circulation. The trough in this case is

reached in Zul-Quidah as a result of withdrawals from banks to finance increased cash transactions and to settle import bills. Thereafter, as the currency in circulation gradually declines, demand deposits gain and reach their peak in Jumad Al-thani with the increased flow of government expenditures. This is followed by a decline as payments are effected for imports made to meet the increased demand during the Ramadan and the pilgrimage season.

The average contribution of the time-deposit ratio ( $t$ ), according to Table 10, was .53 percent, while its standard deviation was 7.03 percent. The relatively low fluctuation in the average influence of the  $t$  ratio indicates its stable and high positive effect on the money stock growth. Figure 2 shows the behavior of the  $t$  ratio for the period from 1385 A.H. (1965) to 1394 A.H. (1974), and illustrates a secular growth trend. From a low rate of .2035 at the end of 1385 (1965), the value of the  $t$  ratio steadily rose until it reached its peak in the middle of 1391 (1971) at the level of .7256 percent. After that, it recorded a declining tendency through the remaining years of the study.

The required reserve ratio ( $r$ ) has exerted a negative influence on the growth of money equal to -.154 percent, while its variability reached a rate of 43.31 percent, revealing the substantial fluctuation in its average negative contribution to money stock. The behavior of the  $r$  ratio, which is shown in Figure 3, reveals a secular trend through the period of study. This ratio shows a declining tendency through the first eight years, reversing its behavior in the last two



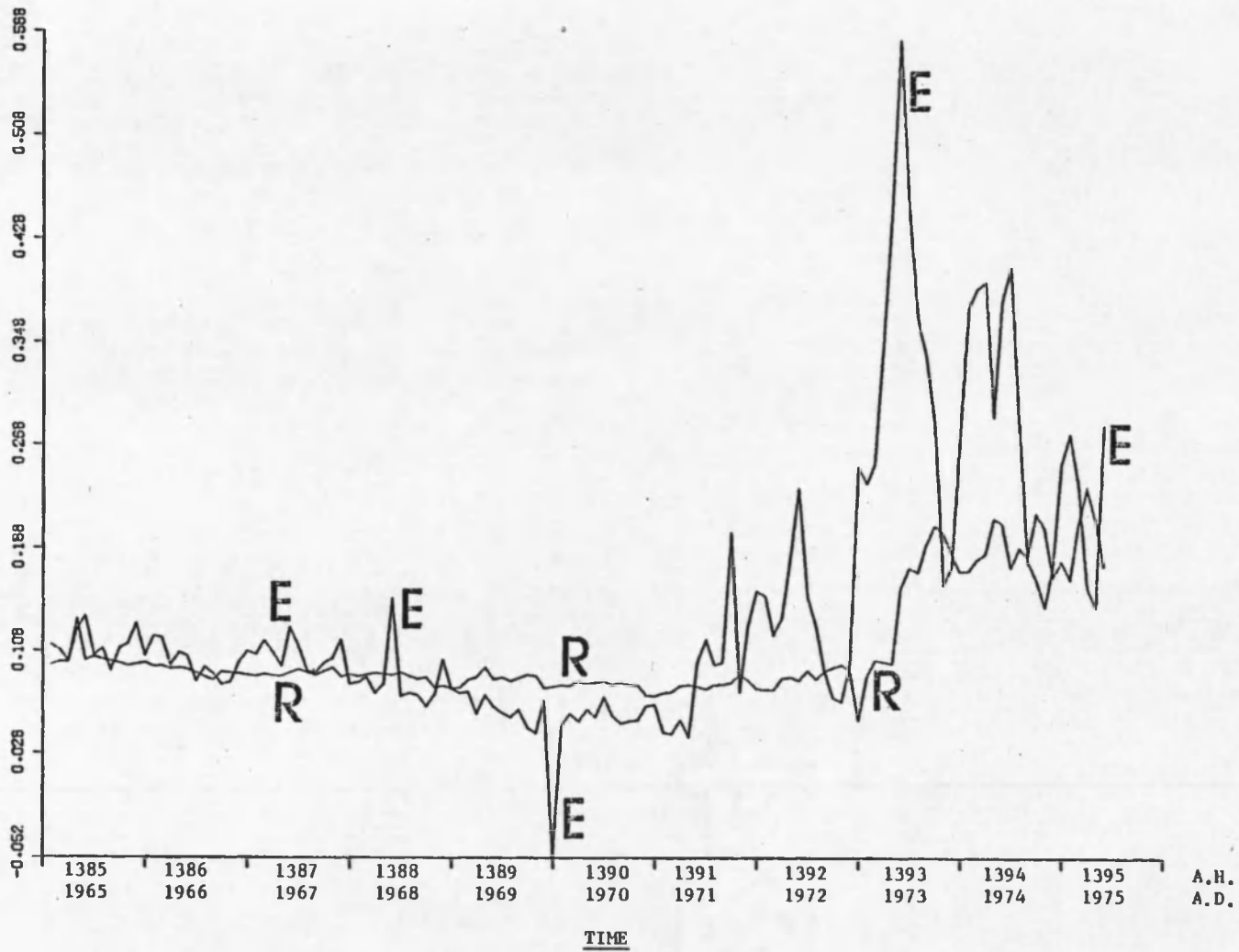


Fig. 3. Trend of the Required Reserve and Excess Reserve Ratios

years to a strong rising trend. The decline in the reserve ratio primarily reflects the effects of the rising proportion of time deposits in total deposits. Average reserve requirements usually are substantially lower on time deposits than on demand deposits, while the forceful growth of the r ratio in the last two years is a clear indication of the healthy rise in the demand-deposits proportion in total deposits and in relation to currency in the hands of the non-bank public.

The mean contribution of the excess reserve ratio (e) was a negative rate of .59 percent, while its standard deviation was 11.09 percent for the period under study (see Table 10). Figure 3 reveals the behavior of the excess reserve ratio for the period under study. This figure illustrates the seasonal tendency for excess reserve holdings to decline in the ninth and last months of each Hegira year and to rise quickly by the first months of the following year. This phenomenon indicates that during the fasting month of Ramadan and during the pilgrimage season, commercial banks need more cash to satisfy the increased volume of transactions; thereupon, they convert their excess reserves with SAMA into cash. The probability that the demand of banks for cash is affected by the aforementioned is further supported by a noticeable tendency towards a comparatively high level of feasts (Eid-al-Fitr and Eid-al-Adha) spending activity in the country. Consumer expenditure is mainly financed by dissaving.

Moreover, Figure 3 shows that there has been a rising trend in absolute terms in excess reserve holdings. The absolute sum of these assets had risen from S.R. 89 million at the end of 1385 (1965) to

the amount of S.R. 838 million by the end of 1394 (1974).<sup>2</sup> The inclination of commercial banks to maintain a significant amount of excess reserves can be attributed to the total absence of a money market in Saudi Arabia, lack of bank managerial ability and experience, and, of course, risk avoidance desire by the banks.

### Seasonal Patterns in the Monthly Variation of Money Stock

In this section we are going to determine statistically if there are any seasonal patterns in the monthly variations of the money stock, the monetary base, the money supply multiplier, and their determinants. To achieve this, we are going to do a seasonal analysis using the following linear regression model:

$$Y_j = b_1 + \sum_{i=2}^{12} b_i \cdot D_i + b_{13} \cdot T_j + e_j \quad j = 1, 2, 3, \dots, 125$$

Where

$Y_j$  = value of dependent variable under consideration for month  $j$ . The dependent variables are  $M$ ,  $B$ ,  $Fx$ ,  $GD$ ,  $m$ ,  $k$ ,  $t$ ,  $r$ ,  $e$ , and the monthly percentage change of each on an annual rate is as follows:

$$M = \frac{\Delta M}{M} = \text{percentage change of money supply}$$

$$B = \frac{m \Delta B_1}{M} = \text{percentage change of monetary base}$$

$$Fx = \frac{m \Delta B_1}{M} = \text{percentage change of foreign exchange}$$

$$GD = \frac{m \Delta B_8}{M} = \text{percentage change of government accounts}$$

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<sup>2</sup>SAMA, Statistical Summary 1395-96 A.H. (1975-76), p. 46.

$$m = \frac{B \Delta m}{M} = \text{percentage change of money supply multiplier}$$

$$k = \frac{B}{M} \frac{\partial m}{\partial k} \Delta k = \text{percentage change in money supply due to change of } k \text{ ratio}$$

$$t = \frac{B}{M} \frac{\partial m}{\partial t} \Delta t = \text{percentage change in money supply due to change of } t \text{ ratio}$$

$$r = \frac{B}{M} \frac{\partial m}{\partial r} \Delta r = \text{percentage change in money supply due to change of } r \text{ ratio}$$

$$e = \frac{B}{M} \frac{\partial m}{\partial e} \Delta e = \text{percentage change in money supply due to change of } e \text{ ratio}$$

$b_1$  = constant term representing the effect of the constant growth over the period in addition to "change between months Zul-Hijjah and Moharam," i.e., monthly change 1

$b_i$  = the effects of monthly changes 2 through 12, where  $i = 2, 3, 4 \dots, 12$

$D_i$  = dummy variables, where  $D_i=1$  if the month= $i$ ;  $D_i=0$  if the month does not equal  $i$ ; for each  $i = 2, 3, 4 \dots, 11$

$b_{13}$  = the coefficient of time; i.e., the slope of the regression line

$T_j$  = time; i.e., month number 1 through 125

$e_j$  = error for monthly change  $j$

### The Tests

First, a coefficient of multiple determination  $R^2$  and an F-test will be used to determine the existence of a statistical relationship between the set of independent variables and each of the dependent variables.

Second, a two-tail t-test will be performed to determine the statistical significance of each of the Beta coefficients.

## The Results

This study covers a ten-and-one-half-year period, starting with Moharam 1385 (1965) and ending with Jumad Al-thani 1395 (1975).<sup>3</sup> Monthly data concerning the different variables of the study were obtained from the Annual Reports and Statistical Summaries published by the Saudi Arabian Monetary Agency.

Table 11 presents the results of stepwise regressions for the money supply, the monetary base, the money supply multiplier, and their determinants. When referring to this table, note that significance was determined using a two-tail t-test. Thus, t-values between -1.96 and +1.98 would indicate that any one seasonality coefficient was not significantly different from zero at the 95% level of confidence. Note also that the data used to compute these regressions were obtained by subtracting the values of the dependent variable in month  $i$  from that of month  $i-1$ , where  $i$  ranged from 2 to 126. Thus, the data used represent monthly changes.

Looking at Table 11, we see a very definite seasonal pattern in the monthly changes of the dependent variables  $M$ ,  $B$ ,  $k$ , and  $r$ . By analyzing the seasonality coefficients, we can see that in general, they have highly significant monthly changes for the first month of the year and for the second half of the year. The coefficient of time is very insignificant for  $M$ ,  $B$ , and  $r$ , but highly significant for the  $k$  variable.

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<sup>3</sup>See Appendix A for a conversion table of Hegira to Gregorian year.

TABLE 11  
REGRESSION COEFFICIENTS AND ASSOCIATED STATISTICS\*

Dependent Variable	$\frac{M}{\Delta M}$	$\frac{B}{m \Delta B_i}$	$\frac{F_x}{m \Delta B_1}$	$\frac{GD}{m \Delta B_8}$	$\frac{m}{B \Delta m}$	$\frac{k}{B \frac{\partial m}{\partial k} \Delta k}$	$\frac{t}{B \frac{\partial m}{\partial t} \Delta t}$	$\frac{r}{B \frac{\partial m}{\partial r} \Delta r}$	$\frac{e}{B \frac{\partial m}{\partial e} \Delta e}$
Constant	10.64 (2.81)**	12.87 (2.32)**	151.49 (4.55)**	-167.44 (2.51)**	-4.91 (1.16)	-10.03 (4.11)**	.62 (.40)	6.44 (.56)	6.82 (1.96)
2	0	0	0	0	21.57 (1.67)	10.16 (2.98)**	0	0	-2.89 (.51)
3	0	0	0	0	0	7.11 (2.26)**	0	-23.16 (1.44)	-8.68 (1.81)
4	0	0	0	0	0	0	0	0	-12.98 (2.70)**
5	0	0	0	0	0	0	0	0	-11.13 (2.31)**
6	0	0	0	0	0	0	0	0	-9.40 (1.96)
7	42.86 (4.33)**	72.82 (4.73)**	0	175.60 (7.75)**	-21.84 (1.76)	0	8.86 (4.39)**	-40.09 (3.02)**	-4.79 (.99)
8	-58.60 (5.69)**	-80.48 (5.02)**	0	0	26.45 (2.05)**	0	-6.21 (2.95)**	26.67 (2.08)**	-6.31 (1.28)
9	21.92 (2.13)**	0	0	0	27.92 (2.16)**	-13.84 (4.66)**	0	29.20 (2.09)**	-6.22 (1.26)
10	52.99 (5.15)**	50.05 (3.12)**	-189.88 (1.61)	0	0	-32.55 (10.57)**	0	23.98 (1.68)	-8.50 (1.73)
11	-40.07 (3.89)**	-38.51 (2.40)**	0	0	0	-8.33 (2.58)**	0	0	-12.09 (2.46)**
12	90.92 (8.84)**	90.72 (5.65)**	0	0	0	-44.92 (13.19)**	0	34.24 (2.23)**	-5.41 (1.10)
Time	0	0	0	0	0	2.70 (7.33)**	0	-1.58 (1.01)	0
R <sup>2</sup>	.619	.467	.021	.328	.112	.670	.201	.209	.112
F	31.97	20.87	2.60	60.13	3.77	33.91	15.33	3.82	1.29
Overall Significance	.001	.001	.110	.001	.006	.001	.001	.001	.237

NOTE: Regressions are based on 125 months of data from 1385 (1965) to mid-1395 (1975).

\*The t-values are given in parentheses below each coefficient in absolute values.

\*\*Significant at the .05 level or better, using a two-tail test.

The high positive t-coefficients for the k ratio reflect an acceleration in its growth rate. This behavior, however, is not expected to prevail in the future.

From the regression  $R^2$ , we find that 62% and 67% of the variations in money supply and the currency ratio respectively, can be explained by seasonal fluctuations and time. For both, the F value shows that the  $R^2$  is greater than zero with a 99.9 percent probability. Although the  $R^2$  of the monetary base and the required reserve ratio are not large, their F values show that they are greater than zero with very high certitude.

The  $R^2$  of the government deposits, the money supply multiplier, and the time deposit ratio, are significant at .001, 00.6, and .001 level, respectively. But, very few of their monthly changes are significant. Thus, for these variables the significant seasonal fluctuations are limited to only a few months in each case.

The two remaining variables, the foreign exchange (Fx) and the excess reserves ratio (e), show only a couple of months that are significant, while their  $R^2$  and overall F value are not significant.

In conclusion, results from the regression equation indicate that the change in the money supply, the monetary base, the currency ratio, and the required reserves ratio, shows a very strong seasonal trend. The beginning of the year shows positive changes (except the k variable), while the second half of the year shows fluctuating significant changes. The variables GD, m, and t, also show some significance for a few months, but the actual seasonal patterns are not strong.

enough and are even more difficult to pinpoint. At the same time, the  $R^2$  for each of these seven equations was found to be highly significant. Finally, the regressions for  $F_x$  and  $e$ , while showing significant seasonal coefficients for only a few months, in neither case showed a significant  $R^2$ .



## CHAPTER 5

### SAMA AND MONEY SUPPLY CONTROL

In Chapter 3 we discussed the proximate determinants of the money supply equation and examined the effects of its essential elements on the money stock in Saudi Arabia. Chapter 4 discussed the behavior of the monetary base and the money supply multiplier, and considered the possibility of a seasonal pattern in this behavior. In that chapter, there was also an analysis of the monthly variations of the main components of these two elements. We will now examine the monetary policy tools available to SAMA and consider their effectiveness in controlling the money supply growth.

The present chapter is divided into two sections. In the first we will discuss the available monetary policy instruments in Saudi Arabia. The second section deals with the problem of controlling the money supply.

#### Available Monetary Policy Instruments

The traditional instruments of domestic monetary policy either are non-existent in Saudi Arabia or are precluded from being effective within the Kingdom. For example, the Islamic religion forbids the use of interest. Thus, discount policy and open market operations are restricted. The only instruments available under the present institutional arrangements are: (a) reserve requirements, (b) foreign

exchange operations, and (c) manipulation of government deposit accounts between SAMA and the commercial banks.

#### Reserve Requirements

The Banking Control Law of 1386 A.H. (1966) gave SAMA the power to vary the required reserves between 17.5 and 10.0 percent, with the approval of the Minister of Finance and National Economy. Thus, SAMA can influence and control the money supply in the country. If the national economic situation calls for an increase in the growth of the money supply, SAMA can lower the required reserve rate by as much as 5 percent to provide more liquidity to the economy. On the other hand, if there is an inflationary trend in the national economy and there is more money than is needed, SAMA can raise the rate beyond 15 percent to reduce the unnecessary liquidity in the economy. Since the introduction of the Banking Control Law, the reserve requirements remained stable until the end of the period under study. Although the required reserve rates help to maintain control in Saudi Arabia in view of the infeasibility of open market operations in securities, they are not totally effective. This is because of the relatively low ratio of demand deposits to currency in circulation on the one hand, and the relatively high ratio--34.2 percent by mid-1394 A.H. (1974)--of cash to total assets for the commercial banks within the Kingdom on the other. Moreover, throughout the period of study there were no reports on SAMA's use of this instrument to influence the liquidity position of the commercial banks. Hence, it is very difficult for us to judge whether

SAMA has used this instrument to offset undesirable movements in the money supply.

#### Foreign Exchange Operations

There is no established official market in foreign exchange in Saudi Arabia. Moreover, SAMA does not undertake any foreign exchange operations other than selling spot U.S. dollars to commercial banks. The flow of oil revenues, which are in foreign exchange, results in a simultaneous increase in the foreign assets of SAMA as well as in government deposits. Almost all foreign exchange assets of SAMA are paid directly to SAMA by the oil companies in monthly installments. This means that this dominant positive source of the Kingdom's monetary base is easier for SAMA to control than it would be if export proceeds were paid to the private sector. Despite this apparent monetary control advantage, SAMA's ability to control foreign exchange is limited by the Agency's overriding concern with stabilizing the value of the Saudi Riyal in relation to foreign currencies.

SAMA foreign exchange operations can be used as a tool for controlling the money supply by regulating the sale of foreign exchange to commercial banks. SAMA can increase or decrease commercial bank reserves, and hence money supply, by selling or buying foreign exchange. During the period under study, SAMA's purchase and sale of foreign exchange from and to the commercial banks are not reported. Lack of data on these operations makes it impossible for us to decide if SAMA has used this tool to control the money supply.

## Government Deposits

In most countries, an increase in government expenditures can be met by one or more of the following three activities: (1) levying of taxes, (2) the sale of securities to the private sector, and (3) money creation. Neither (1) nor (2) is relevant to government expenditures in Saudi Arabia since government revenues come exclusively from oil. This leaves us with money creation as the means by which the Saudi Arabian government can finance its expenditures. However, since the need for government borrowing currently is non-existent, there is no market in government securities. In fact, the government is the source of funds for many sectors of the economy. Therefore, an increase in government domestic expenditures means a decline in government deposits at SAMA. Consequently, there will be a rise in the currency in circulation and the commercial bank deposits and reserves at SAMA, which would result in an increase in the money supply.

SAMA can influence the money supply by the manipulation of deposits between its banking department and the commercial banks. That is, when an increase (decrease) in the money supply is required, SAMA can transfer (withdraw) government deposits to (from) the commercial banks. Throughout the period of study, SAMA did not report whether it used this instrument to offset any undesirable movements in the money supply. In addition, it is not known whether SAMA has complete freedom to manipulate government deposits or if permission is required from the Minister of Finance and National Economy. There were two occasions, in 1381 (1961) and 1384 (1964), where this tool was used but there is

no available information concerning the period under study. Hence, we cannot say definitely that SAMA has used this instrument in the last ten years to influence the money supply.

Even if we assumed that SAMA has been effectively using the three instruments outlined above to offset undesirable movements in the monetary base, it does not necessarily follow that SAMA can effectively control the money supply. It was mentioned previously that the money stock is the product of the monetary base and the money supply multiplier. Since the money supply is determined partly by the money supply multiplier, SAMA has to forecast movements in the multiplier. Moreover, since the value of the money supply multiplier is variable in the short run, prediction of its value and the value of its proximate determinants is necessary in order for SAMA to control the money stock. SAMA has never reported a calculation of or a prediction of the value of the multiplier or its determinants.

#### Controlling Money Supply in Saudi Arabia

In Saudi Arabia the monetary aggregate that can be measured at any particular time is the monetary base sources. The base money uses cannot be analyzed in the short run because it is difficult to measure the currency in the hands of the public and the notes held by the commercial banks.

Evidence presented in Chapter 4 suggests that monthly changes in money stock results mainly from changes in the monetary base and its two dominant components, which are foreign exchange and government deposits.

If the base money were under the direct control of SAMA, the agency would be able to control the variations in the money stock.

Variations in foreign exchange are directly related to movements in the balance of payments, which are beyond SAMA's control. Variations in government deposits are related directly to changes in government expenditures. Government expenditures, being the main source of funds for most sectors of the Saudi Arabian economy, play a major role in affecting the money supply growth. Thus, it would be appropriate to study SAMA's ability to control the money supply. This will be accomplished by statistically investigating whether SAMA takes any action, through controlling government deposits, to reduce the effect of foreign exchange variations on money supply. Hence, we regressed the monthly percentage changes in money supply due to changes in government deposits at SAMA on the monthly percentage changes of foreign exchange, investments, gold, total commercial bank reserves at SAMA, required reserves, and excess reserves.

To accomplish this regression, the following equations are specified:

$$x_7 = f(x_1, x_2, x_5, x_9, x_{13}, x_{14})$$

$$x_8 = f(x_1, x_2, x_5, x_9, x_{13}, x_{14})$$

$$x_7 + x_8 = f(x_1, x_2, x_5, x_9, x_{13}, x_{14})$$

where

$x_7$  = monthly percentage changes in Government Current Account

$x_8$  = monthly percentage changes in Government Special Account

$x_1$  = monthly percentage changes in Foreign Exchange

$x_2$  = monthly percentage changes in Investments

$x_5$  = monthly percentage changes in Gold

$x_9$  = monthly percentage changes in Total Commercial Bank  
Reserves at SAMA

$x_{13}$  = monthly percentage changes in Required Reserves

$x_{14}$  = monthly percentage changes in Excess Reserves

A t-test was conducted to determine the relationship between the dependent and independent variables, and an  $R^2$  and F tests were used to determine the statistical significance of the regression.

From Table 12 we can tell that the t-value for the Government Current Account is highly significant with respect to Foreign Exchange and Gold, but very insignificant for the four other variables. This means that there is a strong relationship between the behavior of Foreign Exchange and Gold and that of Government Current Account.

The Government Special Account t-values do not show any significance for any of the independent variables, except for  $x_9$ , which has a very significant relationship. When we add the two government accounts together, we find that the t-values are highly significant for just Foreign Exchange and Gold, but insignificant for the other four variables. This shows that Government Accounts at SAMA respond spontaneously but not proportionately to variations in Foreign Exchange and Gold.

Although the  $R^2$  of Government Current Account, Government Special Account, and the two accounts added together, are not large;

TABLE 12

## REGRESSION COEFFICIENTS AND ASSOCIATED STATISTICS\*

Dependent Variables	x <sub>1</sub>	x <sub>2</sub>	x <sub>5</sub>	x <sub>9</sub>	x <sub>13</sub>	x <sub>14</sub>	R <sup>2</sup>	F value Significance
x <sub>7</sub>	1.22 (2.82)	.28 (.77)	.25 (2.44)	.26 (.93)	.34 (.80)	.11 (1.16)	.120	3.30 .014
x <sub>8</sub>	.073 (.25)	.070 (.28)	-.037 (-.92)	.45 (2.55)	.40 (1.40)	.66 (.98)	.086	2.81 .028
s <sub>7,8</sub>	1.36 (3.07)	.40 (1.08)	.37 (3.58)	.33 (1.16)	.76 (1.73)	.08 (.76)	.16	5.15 .001

\*The t-values are given in parentheses below each coefficient.



their F values show that they are greater than zero with very high probability.

The results of the statistical test reveal that SAMA takes little action to offset the effect of foreign exchange variations on government deposits, and thus, on money supply. Actually SAMA's main function is to stabilize the Saudi Riyal and fix its value in relation to foreign currencies, as mentioned before. In addition to this, SAMA helps the Ministry of Finance to centralize the receipts and expenditures of the government, and to control government expenditures in accordance with items on the authorized budget. This was regulated by the Royal Decree which established SAMA in the early 1950's. This same decree prohibited SAMA from dealing in interest rates and creating public debts. Given the limitations on the effectiveness of its domestic monetary policy tools (discussed above), SAMA has been and is primarily an agency for implementing the transactional or operating aspects of international investment. Its domestic economic policy analysis capability is rather theoretical and limited at this time.

## APPENDIX A

### CONVERSION FROM HEGIRA TO GREGORIAN DATES

Most statistics of Saudi Arabia are based on the Hegira rather than the Gregorian year. The following is a conversion of dates, based on information from the Saudi Arabian Monetary Agency Statistical Summaries and Annual Reports, for the ten-year period under study.

#### Listing of Years

<u>Hegira Year</u>	<u>Gregorian Year</u>
1384/85	1965
1385/86	1966
1386/87	1967
1387/88	1968
1388/89	1969
1389/90	1970
1390/91	1971
1391/92	1972
1392/93	1973
1393/94	1974
1395	1975

#### Listing of Months

<u>Hegira Year</u>	<u>Gregorian Year</u>
<u>1385</u>	
Moharram	May 30, 1965
Safar	June 28, 1965
Rabie I	July 28, 1965
Rabie II	August 27, 1965
Jumad I	September 25, 1965
Jumad II	October 24, 1965
Rajab	November 23, 1965
Sha'aban	December 22, 1965

Hegira Year1385

Ramadan  
 Shawal  
 Zul-Quidah  
 Zul-Hijjah

Gregorian Year

January 21, 1966  
 February 20, 1966  
 March 22, 1966  
 April 20, 1966

1386

Moharram  
 Safar  
 Rabie I  
 Rabie II  
 Jumad I  
 Jumad II  
 Rajab  
 Sha'aban  
 Ramadan  
 Shawal  
 Zul-Quidah  
 Zul-Hijjah

May 20, 1966  
 June 19, 1966  
 July 18, 1966  
 August 16, 1966  
 September 15, 1966  
 October 14, 1966  
 November 13, 1966  
 December 12, 1966  
 January 11, 1967  
 February 9, 1967  
 March 11, 1967  
 April 10, 1967

1387

Moharram  
 Safar  
 Rabie I  
 Rabie II  
 Jumad I  
 Jumad II  
 Rajab  
 Sha'aban  
 Ramadan  
 Shawal  
 Zul-Quidah  
 Zul-Hijjah

May 9, 1967  
 June 7, 1967  
 July 7, 1967  
 August 5, 1967  
 September 4, 1967  
 October 3, 1967  
 November 2, 1967  
 December 1, 1967  
 December 31, 1967  
 January 29, 1968  
 February 28, 1968  
 March 29, 1968

1388

Moharram  
 Safar  
 Rabie I  
 Rabie II  
 Jumad I  
 Jumad II  
 Rajab  
 Sha'aban  
 Ramadan  
 Shawal  
 Zul-Quidah  
 Zul-Hijjah

April 27, 1968  
 May 27, 1968  
 June 26, 1968  
 July 25, 1968  
 August 24, 1968  
 September 22, 1968  
 October 22, 1968  
 November 20, 1968  
 December 20, 1968  
 January 18, 1969  
 February 17, 1969  
 March 18, 1969

Hegira Year1389

Moharram  
Safar  
Rabie I  
Rabie II  
Jumad I  
Jumad II  
Rajab  
Sha'aban  
Ramadan  
Shawal  
Zul-Quidah  
Zul-Hijjah

Gregorian Year

April 17, 1969  
May 16, 1969  
June 15, 1969  
July 14, 1969  
August 13, 1969  
September 11, 1969  
October 11, 1969  
November 9, 1969  
December 9, 1969  
January 7, 1970  
February 6, 1970  
March 7, 1970

1390

Moharram  
Safar  
Rabie I  
Rabie II  
Jumad I  
Jumad II  
Rajab  
Sha'aban  
Ramadan  
Shawal  
Zul-Quidah  
Zul-Hijjah

April 7, 1970  
May 6, 1970  
June 5, 1970  
July 4, 1970  
August 3, 1970  
September 1, 1970  
October 1, 1970  
October 31, 1970  
November 29, 1970  
December 29, 1970  
January 27, 1971  
February 25, 1971

1391

Moharram  
Safar  
Rabie I  
Rabie II  
Jumad I  
Jumad II  
Rajab  
Sha'aban  
Ramadan  
Shawal  
Zul-Quidah  
Zul-Hijjah

March 27, 1971  
April 25, 1971  
May 25, 1971  
June 23, 1971  
July 23, 1971  
August 21, 1971  
September 20, 1971  
October 20, 1971  
November 18, 1971  
December 17, 1971  
January 16, 1972  
February 15, 1972

1392

Moharram  
Safar  
Rabie I  
Rabie II  
Jumad I  
Jumad II

March 15, 1972  
April 13, 1972  
May 13, 1972  
June 11, 1972  
July 11, 1972  
August 9, 1972

Hegira Year1392

Rajab  
 Sha'aban  
 Ramadan  
 Shawal  
 Zul-Quidah  
 Zul-Hijjah

1393

Moharram  
 Safar  
 Rabie I  
 Rabie II  
 Jumad I  
 Jumad II  
 Rajab  
 Sha'aban  
 Ramadan  
 Shawal  
 Zul-Quidah  
 Zul-Hijjah

1394

Moharram  
 Safar  
 Rabie I  
 Rabie II  
 Jumad I  
 Jumad II  
 Rajab  
 Sha'aban  
 Ramadan  
 Shawal  
 Zul-Quidah  
 Zul-Hijjah

1395

Moharram  
 Safar  
 Rabie I  
 Rabie II  
 Jumad I  
 Jumad II  
 Rajab

Gregorian Year

September 8, 1972  
 October 7, 1972  
 November 6, 1972  
 December 5, 1972  
 January 4, 1973  
 February 3, 1973

March 5, 1973  
 April 3, 1973  
 May 3, 1973  
 June 2, 1973  
 June 30, 1973  
 July 29, 1973  
 August 28, 1973  
 September 26, 1973  
 October 26, 1973  
 November 24, 1973  
 December 24, 1973  
 January 23, 1974

February 23, 1974  
 March 23, 1974  
 April 22, 1974  
 May 21, 1974  
 June 20, 1974  
 July 19, 1974  
 August 18, 1974  
 September 16, 1974  
 October 15, 1974  
 November 14, 1974  
 December 14, 1974  
 January 1, 1975

February 11, 1975  
 March 13, 1975  
 April 11, 1975  
 May 11, 1975  
 June 9, 1975  
 July 9, 1975  
 August 7, 1975

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