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EXCHANGE RATES, PRICES AND INTEREST RATES

Reconsidering the Basic Relationships of Exchange Rate Determination

by

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ABSTRACT

The first part of this paper briefly summarizes the assumptions of economic theory on the relationships between exchange rates, prices and interest rates and at the same time compares these assumptions with the empirical evidence. The fact that there exist strong discrepancies, which in recent years have widened, has motivated the attempt to find new hypotheses. A detailed analysis of the appreciation process of the dollar in the early 1980's leads one to the conclusion that destabilizing currency speculation does actually exist. This "bubble" process has also been identified for the period between the end of 1972 and mid 1973 and for the year of 1978.

To observe the configuration of relative price levels and relative real interest levels in time leads one to a new hypothesis about exchange rate dynamics. The expectation formation and the actual movements are explained by the interaction of disequilibria in the goods and asset markets (the exchange rate is thus conceived as both a flow price and an asset price).

This disequilibrium approach rejects the validity of uncovered interest parity. The most important institutional condition for destabilizing currency speculation is identified as the basic assymmetry in capital mobility between asset holders and liability holders. This explains to a large extent how (first) debitors and (then) creditors and thus the whole international system has fallen into its current troubles.

Finally, this paper concludes that exchange rates remain fundamentally unstable since one price cannot clear two markets (given the condition of freely floating short-term capital).

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Purchasing Power Parity, Interest Parity and the Empirical Evidence

The exchange rate fluctuations in the late 1970's and early 1980's have contradicted progressively more the two basic assumptions which are embodied in all theories of exchange rate determination.[1] These two assumptions operate on different sides of the market (real and monetary) and are referred to as the Purchasing Power Parity Theorem and the Uncovered Interest Parity Theorem.

The first relationship assumes that the exchange rate E(t) (the price of the foreign currency in terms of the domestic) equalizes the domestic and foreign price levels P(t), P*(t)[2]:

$$E(t) = \frac{P(t)}{P^*(t)} \qquad (1)$$

Thus the change in the exchange rate reflects the inflation differential:

$$e(t,t+n) \equiv p(t,t+n) - p^*(t,t+n) \qquad (2)$$

where e(t,t+n), p(t,t+n) and p*(t,t+n) represent the respective discrete changes expressed as annual percentages,[3] i.e.:

$$e(t,t+n) = \frac{E(t+n)}{E(t)} - 1.$$

The uncovered interest parity condition ("Fisher open")

states that the expected exchange rate variation offsets the interest differential and thus equalizes the expected yields on domestic and foreign assets:[4]

$$\frac{(t)E(t+n)}{E(t)} = \frac{1 + i^*(t,t+n)}{1 + i(t,t+n)} \tag{3}$$

or

$$(t)e(t+n) \cong i(t,t+n) - i^*(t,t+n) \tag{4}$$

where $i(t,t+n)$, and $i^*(t,t+n)$ represent the domestic and foreign interest rate respectively for the time period between t and t+n and $(t)e(t+n)$ represents the expected exchange rate change during n periods ahead ("t" set in front of a symbol generally denotes the value that is expected at t to prevail at t+n).[5]

Figure 1 shows the performance of both parity conditions during the 1970's and early 1980's. The upper diagram plots the real effective exchange rates of the five SDR currencies. If PPP were to hold continuously the exchange rate curves should follow the 100-line (if we leave aside the methodological problems of index construction in a world with more than one commodity). This was obviously not the case. If PPP is assumed to hold only in the long run, the real exchange rates should tend back towards equilibrium after short lasting deviations. After the turbulent period of the early 1970's the exchange rates seemed to follow this equilibrating pattern for some years. But from 1977 on the system seems to have become more and more unstable. The deviations from PPP increased over longer periods almost continuously: the dollar depreciated between October 1977 and October 1978 by 8.2% in real terms and appreciated after a relatively stable period almost continuously between September 1980 and November 1982 by 28.1%. Thus, the dollar reached the same level of overvaluation as in 1970 under the conditions of "Bretton Woods". The

real value of the pound increased drastically by an incredible 72.1% between 1976 and January 1981. It has fallen since then but still remains strongly overvalued (for an analysis of this particular phenomenon see Buiter and Purvis [1983]). The yen appreciated in real terms between November 1976 and August 1978 by 33.0%, depreciated in the following 15 months by 27.0%, appreciated again by 20.0% until January 1981, depreciated during the recession by 24.5% and has appreciated again since October 1982.

The fact that these upward and downward movements developed almost continuously also casts doubts on the validity of uncovered interest parity. Assuming that the realized exchange rate change equals its expected value plus a forecast error with a zero mean:

$$e(t,t+n) = (t)e(t+n) + u(t) \qquad E[u(t)] = 0 \tag{5}$$

It follows then that the deviations of the ex post observed exchange rate changes from the interest differential should be distributed at random with a zero mean:

$$e(t,t+n) - [i(t,t+n) - i^*(t,t+n)] = u(t) \quad E[u(t)] = 0 \tag{6}$$

The second diagram of figure 1 shows the actual interest differential and the exchange rate change between the dollar and the 4 other reserve currencies (since this study focuses on the price of the dollar as common denominator, the U.S. is treated as the foreign country).[6] Until the mid 1970's the deviations between the 3 month changes of the dollar rate and the respective interest differential, though very large, seem to be distributed at random. But beginning in October 1976 the depreciation of the dollar exceeded continuously the interest differential for more than two years (with the exception of two months). The strong appreciation of the dollar in the early 1980's contradicted the

uncovered interest parity condition fundamentally. Between August 1980 and August 1982 the interest on dollar deposits was permanently higher than the average on deposits denominated in in the 4 other currencies (by 4.2% on average), which should have led to the expectation of a continuous dollar depreciation. Actually, the dollar appreciated against these currencies almost continuously by 46.4%.[7]

Exchange Rate Movements and Economic Theorizing

I shall now briefly summarize which role the two parity conditions play in the different theories of exchange rate determination.

The Flow Approach

In the traditional "flow approach" PPP determines the exchange rate. Any inflation differential leads to an imbalance in the current account through commodity arbitrage. This imbalance causes a corresponding exchange rate adjustment which therefore ensures both PPP and a balanced current account. This purchasing power concept prevailed in the economic theory until the beginning of the 1970's. Since there was no experience with floating exchange rates, economists who supported such a system, like M. Friedman, H.G. Johnson, F. Machlup and J.E. Meade, expected only small deviations from PPP. These deviations were thought to be small due to private speculation and a highly elastic reaction of the current account.[8]

The Keynesian version of the "flow approach" incorporates two other variables which influence the exchange rate. Higher economic growth leads to a currency depreciation through higher

imports as do higher interest rates abroad through capital outflows.

The Asset Market Approach

Shortly before and after the U.S. had abandoned the gold convertibility of the dollar short term capital movements increased strongly. This movement lead to the definite break-down of "Bretton Woods" system in March 1973. These capital transactions continued to grow much faster than those of the current account. Economic theory reflected this development by introducing the "asset market approach" of exchange rate determination. (For a systematic survey of the different asset market models see Frankel [1983].)

The Monetarist Model

The monetarist asset market model (developed by Frenkel [1976] and others) incorporates the most restrictive assumptions, that PPP and interest parity hold at any point in time. The evident deviations from PPP already observed in the first phase of the floating exchange rate system (see figure 1) were attributed to the turbulence of this period and thus left aside. But shortly after this model was developed the overshooting depreciation of the dollar in 1978 casted doubt on the empirical relevance of the assumption of perfect price flexibility (see figure 2 which plots some basic information about prices and interest rates for the dollar/mark relation).[9] As one can see from the figures the deviations from PPP and their changes were still much stronger between June 1980 and November 1982.[10]

The Overshooting Model

At the same time Dornbusch [1976] developed a model which allows for the overshooting of exchange rate movements. He assumes that prices are sticky in the short run and therefore argues that PPP holds true only in the long run. Still, it is assumed that exchange rate expectations are formed according to uncovered interest parity. But reality has also contradicted the results of this model soon after its publication. The third diagram of figure 2 shows that the dollar depreciation continuously exceeded by a large margin the interest differential between September 1977 and September 1978.

In order to determine the performance of the uncovered interest parity condition, the variable which has an expected value of zero was calculated and plotted in figure 2 (at annual rates):

$$ERR = \frac{[1 + i^*(t,t+n)]}{[1 + i(t,t+n)]} \quad \frac{E(t,t+n)}{E(t)} - 1 \qquad (7)$$

This rate reflects the ex post observed excess return on foreign assets expressed in the domestic currency. It is identical to the risk premium (plus an error term) required to hold foreign assets if there is no perfect capital substitutability. This variable should be distributed at random around a mean of zero if uncovered interest parity is to hold. But between September 1977 and September 1978 it lay almost continuously below zero and amounted to an average of -13.8% as figure 2 indicates.

This empirical evidence also contradicts the monetarist model in addition to the empirical deviations from PPP. Therefore those tests which only covered the period until 1977 including the abstraction from the '73 period, could not reject the validity of both models (For an evaluation of their differences see Frenkel [1979, 1981]). But, as shown by figures 1 and 2,

both models performed rather poorly thereafter (for a summary see Frankel [1983]). The results would have been even more disastrous if the studies had also covered the full period from July 1980 to August 1982. It was in that period that the deviations from uncovered interest parity (and PPP) reached their maximum.

Two Adoptations: New Information and the Risk Premium

Economic theorizing reacted to the parity deviations, in the second half of the 1970's, in two ways. First, economists began to stress the importance of "news" and second, they relaxed the assumption of perfect capital substitutability.

The Role of the "News"

In the first case the deviations of the exchange rate from its expected value are attributed to new information (N) emerging between t and t+n. Thus (6) becomes:

$$e(t,t+n) - [i(t,t+n) - i^*(t,t+n)] = N + u(t) \quad E[u(t)] = 0 \qquad (8)$$

One interpretation of this "news" approach implies that in order for the deviations to be explained "news" must have occurred.[11] However, this general concept can only account for single deviations and not for their serial correlation. This is so because one cannot assume that the reaction of the market to new information is systematically biased.

Another way to analyze the importance of new information is to model them empirically using the difference between official forecasts and the actual outcome as an approximation of the "news". Dornbusch [1980] followed this approach but found that

only a small part of the exchange rate deviations could be explained. Frenkel [1981] and Edwards [1983] using different approaches also could not explain sufficiently these deviations.[12]

Risk Premium and the Portfolio-Balance Approach

In another attempt to explain reality, the exchange rate deviations were attributed to the existence of a risk premium. It was therefore assumed that assets denominated in different currencies were not perfect substitutes. The risk premium is defined as the expected excess return on a certain asset which is required to compensate for the associated higher risk. Such a risk can stem from different sources (political changes, tax treatment, default risk) but with respect to different currencies the exchange rate risk is by far the most important. Thus we assume that foreign and domestic assets differ only in this respect. Now the deviations of the exchange rate from uncovered interest parity can be attributed to two components; one is unexpected and follows a white noise process (new information) and the other is expected and can, a priori, take any sequence of values (risk premium).
Therefore (8) becomes:

$$e(t,t+n) - [i(t,t+n) - i^*(t,t+n)] = N + R + u(t) \quad E[u(t)] = 0 \quad (9)$$

If we include N into the error term the risk premium for holding foreign assets is equal to the excess rate of return as defined above.

The portfolio balance models of exchange rate determination generally assume that the risk premium differs across countries (currencies). If the risk premium is constant in time an increase in the interest differential or the expectation of an

appreciating foreign currency leads to a portfolio shift out of domestic assets and into foreign assets:

$$\frac{F(t)E(t)}{D(t)} = \Delta\,[(i^*(t,t+n) - i(t,t+n)) + (t)e(t+n)] \qquad (10)$$

where F(t) and D(t) are the foreign and domestic assets respectively with a maturity of n periods and Δ is a positive-valued function.

Introducing certain assumptions about the formation of (t)e(t+n) and solving for E(t), yields the basis of the portfolio-balance approach of exchange determination. Empirical tests of this simpliest version of the portfolio balance models produce rather poor results if the period after 1977 is included (see for example Frankel [1983]).

More sophisticated portfolio-balance models incorporate a time-variant risk premium as an endogenous variable. However, they too produce poor results when tested empirically (see Dooley and Isard [1983]).

Most of the empirical studies testing uncovered interest parity conclude that the unexplained deviations of the exchange rates from their expected values should be attributed to a risk premium and that this risk premium might change in time. Since there is the danger of circular reasoning (calling every deviation ex post "risk premium") one has to examine this explanation carefully. First, we will look at the performance of this risk premium (excess rate of return) during the first phase of the recent dollar appreciation against the mark (see also figure 2):

		EXCESS RATE OF RETURN	OVERALL RATE OF RETURN
JULY	1980	21.5	31.8
AUGUST		32.7	42.5
SEPTEMBER		46.3	56.3
OCTOBER		42.8	52.9
NOVEMBER		56.2	67.0
DECEMBER		35.4	46.6
JANUARY	1981	38.8	49.2
FEBRUARY		33.9	45.4
MARCH		52.1	67.4
APRIL		55.9	71.0
MAY		41.4	55.9

As can be seen investors attached a rather large risk premium to the dollar (on the average of 41.5% over 11 months). They must therefore have considered a dollar depreciation much more probable than a DM depreciation. But at the same time the dollar actually appreciated against the DM strongly and continuously. Associated with this exchange rate change were large shifts of financial assets out of the DM and into the dollar (if the excess return on dollar assets had in fact been a risk premium no large shifts should have occurred). This strongly indicates that investors considered it actually riskier to remain in the DM. It can therefore be concluded that it seems somewhat meaningless to generally interpret deviations from uncovered interest parity as a risk premium. This is especially true if the excess return results from a sustained process of currency appreciation.

A Different Interpretation: The Existence of "Bubbles"[13]

The alternative interpretation is rather simple. If a currency is widely expected to appreciate the corresponding capital movements lead to the anticipated result (often unexpected in its extent). This induces further portfolio adjustments causing the

appreciation to continue. Since the actors in the international financial markets understand this feed-back mechanism, such a kind of "bubble path" can last for some time.[14]

In order to characterize the profitability of capital movements associated with a sustained appreciation process the overall rate of return (ORR) on an asset shifted from the domestic into the foreign currency was calculated (at annual rates expressed in the domestic currency):

$$ORR = [1 + i^*(t,t+n)]\,[1 + e(t,t+n)] - 1 \qquad (11)$$

The second column in the above table as well as figure 2 show that one could have earned an average interest of 53.3% for the 11-month period just by swapping a 3 month deposit from DM into Eurodollars. But what is still more impressive is the continuity of these truly high yields (compared to the then generally depressed profits of the real sector due to the recession).

What are the conditions for the beginning of such a self-fulfilling process? In other words: What makes a currency "widely" expected to appreciate? Again we will try to find a first answer within an inductive approach, looking carefully at the configuration of the basic variables (figures 2 and 5). In January 1979 the strong depreciation of the dollar had come to an end when it lay, by 19.0%, below the PPP level. Partly as a consequence of the undervaluation of the dollar the US current account became active in 1979 (for the first time in 3 years). At the same time, the German current account deteriorated unlike anytime in post-war history, due to the combined effects of a strongly overvalued mark as well as the second oil price shock. Thus the goods market formed the expectation of an appreciation

of the dollar against the DM. But this expectation was held in balance by the asset markets, through a continuous increase of the real interest differential (from + 1.5% in 4Q78 to + 4.7% in 3Q79). There were thus two forces, working in opposite directions, which helped maintain the status quo.

However, in the last quarter of 1979, the real interest differential began to narrow again. Instead of the asset markets holding the expectation from the goods market in check, it now served to reinforce this already strong motivation. Consequently, there were huge capital movements out of the DM and, in turn, an upward movement of the dollar. Between January and April 1980 the dollar appreciated by 8.6%. This spiral process was briefly interrupted only once by a sharp fall in dollar interest rates. But as soon as these rates increased again, the continuous, self-sustaining appreciation of the dollar began to take root. Both variables which form exchange rate expectations, the "real" forces of the goods market and the "monetary" forces of the asset market, were now working in perfect unison.

Once such capital and exchange rate movements come to start, their enormous profitability causes a bandwagon effect in international financial markets. This induces a further currency appreciation so that the profitability of changing the currency denomination of assets endures.

It follows from this feed-back mechanism that such international movements will not stop near the PPP line. Shooting "through" becomes a consequence of a preceding over-shooting. Though already far above the PPP level the dollar continued to appreciate until November 1982. Thus, changing the asset denomination from DM into dollars still yielded high extra profits (in 11 months 28.1% on average). Again the sequence of these extra profits is still more striking:

OVERALL RATE OF RETURN

OCTOBER	1981	23.0
NOVEMBER		38.3
DECEMBER		36.0
JANUARY	1982	33.5
FEBRUARY		4.7
MARCH		23.8
APRIL		26.9
MAY		45.2
JUNE		27.8
JULY		25.5
AUGUST		24.4

The bandwagon effects not only strengthen the exchange rate movement in time but also across currencies. This is especially evident if the speculation concerns the key currency of the world economy since more and more assets of different currencies change their denomination. Figure 4 shows that the huge deviations from interest parity followed a similar pattern for all important currencies between 1980 and 1982. This is also reflected by the high profitability of the respective portfolio shifts (overall rates of return in domestic currency; the data for 1982 represent the average of the first three quarters):

	DM	YEN	POUND	FRANC	LIRA	SWISS FRANK
1980	32.2	-2.4	12.1	31.7	35.5	29.2
1981	30.0	30.4	41.4	39.7	42.0	16.7
1982	23.3	29.5	30.1	38.1	32.5	33.2

Thus an investor could have more than doubled his capital in less than three years by changing its currency denomination (only in the case of the yen the profitability was a little less). The fact that this occurred during the longest post-war recession only served to increase the attractiveness of the currency game (but might also have deepened the recession).

How does such a process of continuous and therefore self-fulfilling currency speculation come to an end? The greater the

deviations from PPP become and the longer the whole process lasts the stronger become the counterforces of the "fundamentals". The current account deteriorates leading to the expectation of a necessary depreciation in the near future. Thus the flow of speculative capital becomes weaker so that the process of a continuous appreciation finally stops. This is exactly what happened to the U.S. in the second half of 1982 and to Germany in the beginning of 1979. What follows is a precarious period of balance. In order to prevent a sudden depreciation the country with the overvalued currency compensates for the depreciation pressure of the current account by offering higher interest rates (in such a situation the interpretation of an excess return as a premium for the high exchange rate risk makes perfect sense). Such an increasing real interest rate differential characterizes the situation of the dollar since the end of 1982 as it was typical for the overvalued DM in 1979.[15]

The combined effect of an overvalued currency and high real interest rates necessarily causes a persistent external and internal imbalance. Once the interest rate falls below the level of balance the next bandwagon movement will begin. The "real" and the "monetary" forces join and again cause the formation of unambiguous expectations.[16]

Some Generalizations and its Empirical Evidence

The Role of the Goods Markets

Exchange rate expectations are formed through two different channels. The first represents the influence of the goods markets:

$$(t)e(r) = \phi\left[\frac{P(t)/P^*(t)}{E(t)} - 1\right] + \Theta\left[\frac{P(t-1)/P^*(t-1)}{E(t-1)} - 1, \ldots\ldots \frac{P(t-n)/P^*(t-n)}{E(t-n)} - 1\right] \qquad (12)$$

The exchange rate variation expected due to the "real" forces of the fundamentals (t)e(r) is a function of the discrepancy between the actual spot rate and purchasing power parity and the shape of past deviations from PPP. The more a currency is overvalued the more it is expected to depreciate. The second term represents the influence of the duration of deviations from PPP. The longer a currency is overvalued and the stronger the deviations have been, the higher is the actual and expected depreciation (this results from the accumulation of increasing current account deficits). If the deviations from PPP are distributed at random with a mean of zero the function Θ does not influence the expectation formation.

The Role of the Asset Market

The second channel represents the influence of the asset market:

$$(t)e(m) = \psi [r^* - r] + \Pi [E(t), E(t-1).....E(t-n)] \qquad (13)$$

The exchange rate variation expected due to the "monetary" forces of the asset market (t)e(m) is a function of the real interest differential and the shape of the past values of E. The more the foreign interest rate exceeds the inflation differential the more is the foreign currency expected to appreciate. This is so because there remains an extra profit even if the inflation differential causes a depreciation according to (12) This extra profit is expected to be exploited by capital movements leading to an overall appreciation. The second term is only relevant once some kind of "bubble path" has come to start. The more the past values of E are positively correlated the higher is the expected appreciation since more and more actors are expected to

join the bull brigade. As long as E follows a random walk the function does not influence the expectation formation.

The Interaction of the Goods and Asset Markets

The overall expectation of exchange rate change is the result of the combined "real" and "monetary" forces:

$$(t)e = (t)e(r) + (t)e(m) \qquad (14)$$

It is further assumed that the actual exchange rate change depends on the set of the expectations of all actors (i)

$$e(t) = \Omega \left\{(t)e_i\right\} \qquad (15)$$

This relationship reflects the feedback from the expectations of the actors as a whole via their capital portfolio adjustments to the actual spot rate. But only the existence of this function and the direction of the relationship are assumed to be known. Thus we interpret any observed exchange rate change as the aggregate outcome of the individual expectations.[17]

Given the existence of the feed-back mechanism any individual actor is forced to form expectations with respect to the expectations of all other actors. This dilemma was first described by Keynes in his famous "beauty contest" example.[18] It seems to be particularly important in the case of exchange rate determination, since the specific characteristics of international financial markets generate extreme feed-back forces.[19] To deal with this problem we again assume that only the signs of the coefficients of each individual's function ϕ, Θ, ψ and π are the same and generally known but not their specific shape.[20]

Given the information about prices and interest rates the actors use ϕ, Θ, ψ and π as rules to form qualitative expec-

tations as to whether an exchange rate will go up or down. An unambiguous result forms a sufficient basis to act (i.e., to adjust the currency portfolio). If the "real" and "monetary" forces conflict, the situation depends on the extent of the disequilibria in the goods and asset markets. As long as the deviations are small the situation can be considered stable. If, however, two increasing disequilibria prevail, such that quantitatively unknown expectations are counterbalanced, uncertainty will grow and capital and exchange rates will move relatively little.

The Basic Configurations of Exchange Rate Expectations

With respect to the interaction of the "real" and the "monetary" channels, four states of expectation formation can be distinguished:

I. Fundamental equilibrium:

$$(t)e = (t)e(r) = (t)e(m) = 0$$

This state depicts the monetarist case. No exchange rate variation is expected if PPP and uncovered interest parity hold so that the real interest differential is zero. As figure 2 shows this particular configuration is difficult to locate empirically. For the dollar/mark relation this was observed only once, between mid 1975 and mid 1976 (then the real appreciation of the mark was sterilized by an increasing real interest differential).

II. Precarious equilibrium:

$$(t)e = 0$$
$$(t)e(r) = - (t)e(m)$$

When a persistent overvaluation of a currency is offset by an increasing real interest differential a "precarious" equilibrium, with a specific type of uncertainty, develops. This is a consequence of the general "beauty contest" problem and the fact that the "real" and the "monetary" forces lead to contradictory expectations. The degree of uncertainty and thus the "precariousness" of the situation depends on the off-setting disequilibria in the goods and asset markets.

Let us take the mark/dollar rate in the year 1979 as an example of such a precarious equilibrium. In January the dollar was undervalued by 19.0%, the real interest rate in Germany was by 1.2% higher than in the U.S. In such a situation one actor might expect a dollar appreciation attributing more weight to the "real" forces (ϕ) than the "monetary" ones (ψ). But he won't act on this assumption alone, since he does not know how the other actors evaluate their contradictory (t)e(m) and (t)e(r). The increasing disequilibrium in the goods market (the German current account deteriorated more and more whereas the U.S. earned a growing surplus) could not harmonize the expectations since it was offset by an increasing disequilibrium in the asset markets. In the last quarter, German real interest rates were already 4.6% higher than in the U.S. (this can be interpreted as a risk premium.) Therefore no significant capital movements took place. However, uncertainty increased since this equilibrium was only the result of two counterbalancing (but still growing) disequilibria. In such a situation the desire for more confidence increases. Exogenous events, therefore, become particularly important as signals which harmonize the divergent expectations. It seems probable that the announcement of a new monetary policy by the Fed in October 1979 served as such a signal, especially

since it was followed by an increase in the U.S. rates. Thus the conditions for a "bubble path" movement of the dollar were set into play.

Since the end of 1982 such a precarious equilibrium has again prevailed. During the first quarter of 1983 the dollar was overvalued by 17.6% and at the same time the real interest rate in the U.S. was 2.6% higher than in Germany, the widest differential for more than 15 years. Both factors will impede a sustained recovery of the U.S. economy and deteriorate the current account thus laying the ground for the next dollar depreciation in a "bubble path" manner.

III. Precarious disequilibrium:

$(t)e \neq 0$

$(t)e(r) \gtrless (t)e(m)$

This state can be distinguished from the precarious equilibrium more on theoretical grounds than on empirical analysis. One must identify one of the two forces, real or monetary, as being dominant in order to avoid circular reasoning. Let us take the period in the last quarter of 1977 and the first quarter of 1978 as an example. Even though the dollar exchange rate was slightly below the PPP level it is reasonable to assume that the "real" forces formed the expectation of a depreciation. In the last quarter of 1977 and again in the first quarter of 1978 the U.S. current account showed the largest deficits in post-war history (- 11.7 Bill $), whereas Germany earned the second highest surplus (+ 6.0 Bill. $) in two consecutive quarters (see figure 5). Since the real interest differential decreased only slightly in the last quarter of 1977 the strong forces of the

goods market dominated and lead to an overall expectation of a dollar depreciation. This was strengthened by the fact that the real interest differential also increased from February 1978 on, finally constituting an unambiguous exchange rate expectation.

IV. Fundamental disequilibrium:

$(t)e \neq 0$

$(t)e(r) > 0,\ (t)e(m) > 0$

$(t)e(r) < 0,\ (t)e(m) < 0$

If the "real" and the "monetary" forces form an unambiguous exchange rate expectation, a corresponding change, through induced portfolio adjustments, takes place. This situation was described above for the case of the mark/dollar relation in the first half of 1980. This configuration explains also the dollar appreciation against the other currencies in 1980. In any case the undervaluation of the dollar coincided with a strong relative increase of the real interest rates in the U.S.

Let us describe such a kind of "bubble path" and thus the interaction of (13) and (15) in a more general way. We start from an initial condition of equilibrium [$(t)e = 0$]. Any significant change of $(t)e$ strongly affects the expected extra profits from a portfolio adjustment $[i(t)^* - i(t) + (t)e]$. Assume that the foreign currency is expected to appreciate. This will cause a shift in the currency portfolio (contrary to the basic portfolio equation represented by (10) we assume that the capital flows dF, dD and not the respective stocks are determined by the expectation of an extra profit; if no such profits are expected no portfolio adjustments take place):

$$[dF(t) - dD(t)] = f[i(t)^* - i(t) + (t)e] \qquad (16)$$

This induces an appreciation since in the very short run:

$$e(t) = f[dF(t) - dD(t)] \qquad (17)$$

The stronger the initial change of (t)e the more likely is it that the interaction of (16) and (17) will cause a sequence of appreciations in the short run. Intuitively we can assume that the strength of the original push of (t)e depends on the initial conditions. The higher the degree of "precariousness" of the initial equilibrium, i.e. the stronger the off-setting disequilibria in the goods and asset markets, the stronger is the change in expectations once the conditions in the financial market "tilt".

Once a short-term sequence $\{E(t) > E(t-1) > \ldots E(t-n)\}$ has occurred, further appreciations are expected through the second term of (13):

$$(t)e = \pi [E(t), E(t-1) \ldots E(t-n)] \qquad (18)$$

Due to the high profitability of such a sequence, the function π dominates the process of expectation formation. The persistently positive (t)e then causes further portfolio changes through (16). After the exchange rate has passed the PPP level the "real" forces begin to smooth the expectation of further appreciations, but this influence, at first, remains relatively weak for the following two reasons: The goods market reacts slowly to changes in relative prices[21] and the bandwagon effects represented by, π ,continue to prevail due to its self-fulfilling properties.

The more a currency becomes overvalued and the longer this overvaluation endures the stronger are the dampening effects of the real forces on the appreciation process. But the end of the

movement might still be delayed if actors expect that (t)e(m) will generally be realized sooner than (t)e(r) (which implies that the speed of adjustment in the asset markets is higher than in the goods markets). In such a situation an expected depreciation in the medium run can be persistently delayed by a sequence of short-term expectations based on interest rate differentials (again the "beauty contest" problem is of crucial importance).

Finally, the increasing strength of the "real" forces causes a transition towards a "precarious" equilibrium often supported by "signals" harmonizing the expectation formation.

The persistent dollar appreciation of 1980/82 represents the best empirical example for such an exchange rate movement. A similar but shorter "bubble" can also be identified in the early 1970's. This led to the definite break-down of the "Bretton Woods" system in March 1973 (the U.S. is now treated as the domestic country and Germany as the foreign country, as shown in figures 5 and 6). By September 1972 the mark was still strongly undervalued with respect to the dollar and at the same time the level of real interest rates was 2.0% lower in Germany than in the U.S. German authorities, however, in order to reduce domestic inflation instituted a tight monetary policy and caused a sharp increase in the German interest rate. By December 1972 the real rate was already 0.6% higher than in the U.S. and by June 1973 the differential reached 4.8%. This interest rate behavior induced large capital movements and led to a strong DM appreciation and high extra profits. During these 8 months the swapping of dollars for marks yielded an average return of 57.3%. Again the sequence of this overall rate of return is still more impressive:

NOVEMBER	1972	34.4
DECEMBER		62.3
JANUARY	1973	59.7
FEBRUARY		39.7
MARCH		48.1
APRIL		99.0
MAY		75.1
JUNE		40.1

A third "bubble" like movement occurred in the dollar/mark relation between September 1977 and September 1978, even though it was somewhat weaker (due to the different initial conditions already discussed). Figure 6 indicates that capital movements out of the dollar and into the mark yielded an average return of 22.8% (during the same period a Eurodollar deposit provided an interest rate of only 7.6%).

The notion of exchange rate bubbles as used in this paper differs from that described by Dornbusch.[22] His use of the term refers only to a movement which leads the exchange rate away from PPP. He presumably implies that no excess return occurs on the way toward PPP as in his famous over-shooting model (Dornbusch [1976]). In this paper, however, any exchange rate movement producing a continuous sequence of high excess returns through a self-fulfilling mechanism of capital shifts is considered a bubble. Since this characterizes any sustained appreciation movement from the very beginning, the whole process is termed a bubble.[23]

It is generally agreed that bubbles represent possible paths of asset prices in rational expectations models.[24] This possibility, however, is usually assumed away, since any asset price bubble, given conventional behavioral assumptions, is necessarily explosive (or implosive), and therefore its occurrence in reality does not seem reasonable. This assumption is further strengthened by the fact that bubbles can hardly be found empirically (see

i.e. Flood and Garber [1980]).[25] Also the disequilibrium approach to exchange rate determination as sketched in this paper does not assert that bubbles in its "pure" form can be identified in reality. But it has been shown that exchange rate movements which have the typical characteristics of bubbles necessarily occur under certain conditions. They differ from "pure" bubbles in so far as any sustained appreciation process necessarily comes to an end through the depressing effects of the combination of a high exchange rate and a high real interest rate on the real side of the economy. This difference reflects one fundamental perception: the exchange rate is both an asset price as well as a flow price (its property as an asset price makes a bubble possible and its property as a flow price breaks the bubble).

This double role of the exchange rate also explains the specific shape of any exchange rate bubble. The speed of the appreciation process is generally slow compared to price movements in the gold market or stock exchange. Speculators take into account the important role a currency plays for the real side of an economy. For this same reason such a bandwagon movement can not be stopped by short-term fluctuations of the exchange rate. Even during the first phase of the dollar appreciation in the early 1980's small depreciations occurred but already the monthly averages showed a continuous upward process for one year (with the exception of March 1981). Only if there is a strong and simultaneous signal from the goods and the asset markets can such a movement suddenly be stopped.[26]

Exchange Rate Movements as a Sequence of Quasi-Equilibria, Precarious Equilibria and Bubbles

The disequilibrium approach perceives the exchange rate as

both a flow and asset price. Therefore both the current account (goods market) and the capital account (asset market) matter simultaneously. Their interaction generates the exchange rate dynamics through the channel of expectation formation. Three types of exchange rate movements can be distinguished:

- Quasi-equilibrium path
- Precarious equilibrium path
- Bubble path.

The first type aggregates the fundamental equilibrium and all relatively small fluctuations of the exchange rate around its equilibrium value (PPP). I call this type of movement quasi-equilibrium path for two reasons. First, because it also includes small deviations from PPP (since the fundamental equilibrium in a strict sense - including a balanced current account - does not occur in reality) and, second, because the disequilibrium approach considers any state of the exchange rate, even the fundamental equilibrium potentially unstable. In the case of the DM/dollar relation a period of quasi-equilibrium prevailed between the end of 1973 and the end of 1977.

Precarious equilibrium paths, the second typical exchange rate movement represent a period where strong disequilibria in the goods and asset markets offset each other. The high uncertainty involved paralizes the foreign exchange speculations so that these periods paradoxically show the smallest exchange rate fluctuations (during 1979 and since the end of 1982 in the DM/dollar relation).

Bubble paths, the third exchange rate movement, have already been discussed in some detail. They have dominated the foreign exchange market for DM/dollars between the end of 1972 and mid-1973, during 1978 and during the early 1980's.

The transition between bubbles and precarious equilibria can

be explained by the fact that both forces moving the exchange rate affect simultaneously the real world of production and trade and the monetary world of the financial markets, but necessarily in an opposite way.

A high real exchange rate and a high real interest rate dampen aggregate demand directly through a relative decrease of exports and investment and indirectly through the effects of the income redistribution from net debitors (like the non-financial businesses and public households) to the creditors (like the financial sector and most of the private households).[27] The decrease in both demand and output together with the specific effect of an overvalued currency on import prices reduces inflation significantly (at the cost of growing unemployment). The current account deteriorates only with some time lag since the negative market share (substitution) effect is compensated by the overall (income) effect for some time.[28] The longer such a situation lasts the stronger become the disequilibria in the international goods and asset markets. In addition the downward pressure on both the exchange rate and interest rate from the real side of the depressed domestic economy increases. Once the situation has become very precarious it seems improbable that the system can return to the conditions of a quasi-equilibrium in a stable manner. Thus any exchange rate bubble generates the conditions for the next one.[29]

The opposite effects are caused by a depreciation bubble. The combination of a low real exchange rate and a low real interest rate stimulates demand, output and employment as well as an improvement in the current account. At the same time inflation increases for two reasons. First, because potential GNP cannot catch up with the high growth of aggregate demand and second

because the low exchange rate causes higher import prices. This configuration is necessarily associated with an income redistribution in favor of debitors, like non-financial businesses and public households (as well as LDC's when speaking in an international context).[30] In such a situation any significant increase in interest rates (as induced by the anti-inflationary policies adopted by the U.S. in 1979/80 or by Germany in 1972/73) causes a "tilt" of the precarious equilibrium and hence the beginning of an exchange rate bubble.

Since the real forces always work towards equilibrium any "tilt" which induces the beginning of a bubble originates from the financial markets. In such a case new information often serves as a signal which harmonizes the divergent expectations. The end of a bubble often results less abruptly if it is caused only by the relatively slow but continuous increase of the disequilibrium in the goods market.[31]

The Disequilibrium Approach and Exchange Rate Theories

The disequilibrium approach as developed in this paper should be considered as only a first and somewhat crude hypothesis. In order to give a more precise picture I would like to elaborate upon the specific differences between the basic assumptions of this approach and of the prevailing theories.

The Overshooting Model

Since the dynamics which underlie the deviations from PPP and uncovered interest parity form the central part of the disequilibrium approach it is useful to see how Dornbusch [1976] deals with this problem. He describes the overshooting as follows (starting from an initial equilibrium in the goods and asset

market and assuming a discrete monetary expansion): "At the initial level of prices the monetary expansion reduces interest rates and leads . . . . to the expectation of a depreciating exchange rate. Both factors serve to reduce the attractiveness of domestic assets, lead to an incipient capital outflow, and thus cause the spot rate to depreciate. The extent of that depreciation has to be sufficient to give rise to the anticipation of appreciation at just sufficient a rate to offset the reduced domestic interest rate" (Dornbusch [1976], p. 1168 - emphasis added). He therefore assumes that uncovered interest parity holds (second part of the quotation) but with one exception: those who initiated the "incipient capital outflow" did so because they realized higher interest rates abroad and at the same time expected a depreciating exchange rate (note, depreciation as used by Dornbusch refers to the domestic currency). But this conflicts with the assumption of his equation (1) on p. 1163 (see also footnote 4) that uncovered interest parity holds always. Thus the direct relationship between an initial deviation from PPP and extra profits (due to both higher interest rates and an induced appreciation) was not sufficiently considered. This abstraction was facilitated by an interpretation of the Dornbusch model which states that the "incipient capital outflow" occurs discretely at "time zero". In this case the initial exchange rate change can be treated as unexpected.[32] The fact that any deviation from PPP, induced by an increasing interest differential, inevitably causes the expectation of extra profits plays a crucial role in the disequilibrium approach. As previously discussed this expectation potentially leads to a bubble movement. If it does not, the exchange rate is driven back towards equilibrium by the real forces since the goods market (current account) influen-

ces the exchange rate expectations. In the Dornbusch [1976] model, by contrast, only the condition of uncovered interest parity leads the exchange rate back once the "incipient" capital shift moves it away from equilibrium (the current account does not matter in this model).

The Monetarist Model

The disequilibrium approach contradicts the monetarist model fundamentally. It is therefore not necessary to elaborate the difference theoretically. The empirical evidence suggests that this model is valid mainly during hyper-inflations which is the situation from which it was originally developed. In such a period both the exchange rate and the interest rate are dominated by the inflationary dynamics. Therefore PPP and interest parity hold at the same time. But in the last five years, for example, the deviations of the exchange rates from the values predicted by the monetarist model become larger and larger. Consequently, neither the goods market nor the asset market clear, as the persistent current account surplus/deficit and the offsetting capital flows show.[33]

Uncovered Interest Parity

The monetary channel of exchange rate expectation as hypothesized in the disequilibrium approach implies that uncovered interest parity does not hold. There are two reasons for this assumption; one stems from information derived empirically and the other from theoretical arguments.

The deviations from uncovered interest parity in 1977/78 and 1980/82 have already been described and analyzed. Particularly in the early 1980's uncovered interest parity predicted persis-

tently a dollar depreciation against all non-inflated currencies like the DM, yen, swiss frank and others. But actually the dollar appreciated against all these currencies almost continuously. Assuming that uncovered interest parity generally holds implies that actors do not learn from their concrete experiences (but rather want to do economists a favor).[34]

On more theoretical grounds the distinction between arbitrage and speculation suggests that uncovered interest parity does not hold. First, the formation of expectations about the future spot rate represents so to speak the most important business speculators engage in whereas arbitragers are completely unconcerned with this problem (since only the former take open positions). Second, speculators can expect profits only if they predict a future spot rate which is different from the forward rate (determined by the interest differential). Third, any currency substitution in the asset markets is carried out by speculators who expect some profit (by definition). One can therefore conclude that as long as capital movements exist all expected exchange rates in the asset markets necessarily differ from the forward rate.[35]

This implies that the individual actors do not assume that yields will be equalized across currencies. Instead they will try to take profits from the expected differences.

But this could still lead to an equilibrium <u>outcome</u> through the "invisible hand" and at the same time to smaller exchange rate fluctuations through stabilizing speculation.[36] What are the specific conditions which explain why this is generally not the case in the international financial markets?

The Market Conditions of Destabilizing Currency Speculation

There seem to be at least two answers to the above question. The first focuses on the general differences between asset and commodity speculation (where an asset is considered storeable but a commodity is not) and the second focuses on the different degree of mobility between the asset and the liability holders in the international financial markets.

To begin with a famous quotation of M. Friedman: "People who argue that speculation is generally destabilizing seldom realize that this is largely equivalent to saying that speculators lose money, since speculation can be destabilizing in general only if speculators on the average sell when the currency is low in price and buy when it is high." (Friedman [1953], p. 175.) Thus M. Friedman perceived foreign exchange as a commodity which offers a speculator only two choices, to buy or to sell. But there remains a third possibility, namely to hold, since what matters in this context is the property of foreign exchange as an asset. Suppose a speculator buys dollars forward expecting an appreciation. When the contract matures he is not forced to sell his investment if he predicts a further appreciation. (On the contrary, he will presumably buy additional dollar deposits.) This means that only the effect of buying has occurred (which contributes to an immediate appreciation) and not the stabilizing effect of selling. It is for this reason that bubbles are much more likely in the case of assets than of commodities.

The second characteristic of asset speculation consists of the fact that its success does not necessarily depend on a corresponding seller/buyer willing to accept the price expected by the speculator. This is of crucial importance in the international financial markets. If a speculator does not sell but rather

continues to acquire dollar assets as in the example described above, he does not run a high risk as long as he assumes that the corresponding liability holder (a LDC for example) can not or will not default. There exists one fundamental condition on which this process is based - the different degree of mobility between asset holder and the corresponding liability holders. If the debitors were generally as "free to choose" (to quote M. Friedman again) the currency of denomination of their debt as are creditors, exchange rate bubbles could never last so long.[37] To put it concretely: if the LDC's were given the possibility to swap their dollar debt into French francs for example, in order to minimize their credit costs (expecting a depreciation of the franc which after the victory of F. Mitterand in spring 1981 was easy to predict) this would have had a stabilizing effect on exchange rate movements.

One can therefore conclude that there exists a fundamental assymetry in financial markets since the freedom of capital movement is by far higher on the asset side than on the liability side. Whereas the creditors (asset holders) are free to maximize their profits by shifting capital between currencies the debitors (liability holders) are not as free to minimize their costs in a similar way. This facilitates and extends destabilizing currency speculation during which the creditors increase their profits at the cost of the debitors (insofar as the exchange rate is an asset price it must also be a liability price).

The best empirical demonstration of these relationships is the appreciation of the foreign debt of the non-oil developing countries(LDC's) which has been caused by the recent dollar bubble. The overall return on dollar assets was calculated earlier as the result of the interest rate and exchange rate change. The

same is now true for the overall cost of holding dollar liabilities. To show the exchange rate effect one can calculate the value of the dollar expressed in terms of a currency basket which represents the share of the different currencies in the overall export earnings of the LDC's. This gives us an appropriate measure of how the value of the dollar debt changed. To give a simple example: suppose a country exports to only two countries, the U.S. and Germany, but holds all its foreign debt in dollars. Then any depreciation of the dollar against the DM reduces its debt burden (increases the dollar value of its exports) whereas the contrary is true for a dollar appreciation.[38]

Diagram 1 of figure 7 shows that the exchange rate movements are more important for the changes in LDC's credit costs (effective nominal interest rate) than the interest rate (3 months Eurodollar rate). During the early 1970's and particularly between 1977 and 1979 the dollar depreciation reduced the credit costs of the LDC's significantly. But then these costs exploded due to a combined effect of an increase in both the interest rate and dollar exchange rate. Thus the effective interest the LDC's had to pay (or to roll over) reached 13.9% (1980), 23.3% (1981), and 20.1% (1982).

This debt burden was extremely sharpened by the continuous decrease of the terms of trade since mid-1979 as shown in the second diagram.[39] As a consequence the real interest on the foreign debt of LDC's developed as follows (note: the figure for 1982 was estimated assuming constant terms of trade in the second half of the year):

1977	-4.6
1978	6.3
1979	12.3
1980	16.5
1981	34.8
1982	22.1

This coincided in the early 1980's with an absolute decrease in the real demand of the industrialized countries for products of the LDC's (due to the recession, which as pointed out earlier is related to the boom in the interest rate and exchange rate). It seems therefore that the instability in the international financial system is also the most important reason for the current economic depression in the LDC's and their debt crisis in particular. In this sense it might not have been accidental that the dollar bubble eroded shortly after the financial community realized that sovereign debitors could actually default. This fact confirms furthermore, that the basic assymetry between the asset and liability side of the international financial market is an important condition for the prolongation of exchange rate bubbles.

Goods Market, Asset Market and the Fundamental Instability of Exchange Rates

The disequilibrium approach also differs from the prevailing theories insofar as it assumes that the goods and the asset market matter simultaneously in exchange rate determination. By contrast, the traditional flow approach perceives the exchange rate as that price which clears the goods market whereas the monetary approaches assume that the exchange rate is determined in the asset markets.[40]

Let us now assume that the capital markets are truly free on both sides. The movement of asset holders expecting higher profits and of the liability holders expecting lower costs will thus ensure an equilibrium through the "invisible hand" so that the yields/costs of capital are equalized across currencies. Will this then lead to an overall stable equilibrium in the

market for foreign exchange? It seems as if the answer is no for one very simple reason: One price can not clear two markets.[41]

To demonstrate this fundamental instability of exchange rates concretely let us begin with the asset market. Demand for and supply of foreign exchange originating from the asset market are represented by the respective capital flows dF, dD. The change in the demand for F (= supply of D) and for D (= supply of F) depend on the yields determined by i, i* and dE/E (see also equation 16):

$$dF = dF(\bar{i}, \bar{i}^*, dE/E) \tag{19}$$

$$dD = dD(\bar{i}, \bar{i}^*, dE/E) \tag{20}$$

Given the domestic and foreign interest rates, the equilibrium condition dF = dD ensures a unique solution for dF, dD, and E where the change in the exchange rate exactly offsets the interest differential equalizing capital yields internationally.

Demand for and supply of foreign exchange originating from the goods market are represented by imports (M) and exports (X) of the domestic country (identical with the respective exports and imports of the rest of the world). They depend on the relative price levels determined by P, P* and E:

$$M = M(\bar{P}, \bar{P}^*, E) \tag{21}$$

$$X = X(\bar{P}, \bar{P}^*, E) \tag{22}$$

Given domestic and foreign prices, the equilibrium condition

$$M = X \tag{23}$$

ensures a unique solution for M, X and E where the change in the exchange rate exactly offsets the price (inflation) differential.

Taking the goods and the asset market together we are left with 6 equations but only 5 unknowns. There remains one degree of freedom which causes a fundamental instability of exchange rates. There might exist two primary reasons for why this problem

has been somewhat overlooked. First, both disequilibria in the goods and asset market are hidden behind the equilibrium in the overall market for foreign exchange. It is this overall market which actually gets cleared by the observable exchange rate at any point in time.

Let us call the exchange rate which would clear the goods market and the asset Market E(r) and E(m) respectively. The overall demand for foreign exchange is defined by (M +dF), the respective supply by (X + dD). The condition of market clearing

$$(M + dF) = (X + dD) \tag{24}$$

gives a certain equilibrium exchange rate change E.

We now can distinguish two cases, the fundamental equilibrium and the precarious equilibrium.

In the first case all markets are cleared (the monetarist case) such that

$M = X$

$dF = dD$

$E = E(r) = E(m)$

This solution is purely accidental since there exists one degree of freedom in the system. In the second case only the overall market clears which can be rewritten as follows

$(X - M) = (dF - dD)$.

Any disequilibrium in the goods market is offset by a corresponding disequilibrium in the asset market. In the case of a current account surplus (domestic country) the actual exchange rate is higher than under equilibrium conditions in the goods market [$E(r) < E$], the domestic currency is undervalued. On the other side the actual exchange rate is higher than under the equilibrium conditions in the asset markets [$E < E(m)$]. This in-

dicates a relativly attractive interest rate level in the foreign country.[42]

The sequence of instantaneous equilibrium values in the overall market for foreign exchange is then operated by the interaction of the goods and asset markets in time. The movements of the exchange rate (and consequently the interest rate) as perceived by the disequilibrium approach are therefore the expression of the basic instability of the international financial system.[43]

The second reason for the negligence of this instability problem concerns the increasing tendency in economics to develop models which are perfectly consistent and which exclude fundamental disequilibria by making the appropriate assumptions. Insofar as there actually exist market disequilibria, economic theory necessarily becomes progressively more incapable of explaining the most oppressive problems in reality (they always reflect basic disequilibria).[44]

For the case of exchange rate theory this tendency is reflected by the basic fact that there prevailed either one (consistent) flow approach or one (consistent) asset approach and no in-between. The work of Mundell carried out in a kind of transition period (summarized in Mundell [1968]), seems to be the main exception since he emphasized the interaction between the goods and the capital market and between the related problems of external and internal balance.[45] A good example of a consistent solution within the asset approach lies in the way the monetarist model implicitly deals with the problem of instability. The degree of freedom is eliminated by the simple assumption that the exchange rate determined in the goods market is always identical with that of the asset market.[46]

Concluding Remarks

Instead of drawing final conclusions I would like to leave this section open for critique and discussion. This seems to be particularly important since this study is an attempt to "escape from habitual modes of thought and expression" (Keynes). It therefore contains errors (which I unfortunately do not know) and falls short of an elegant presentation (which I know). Nevertheless, I hope that this essay may help to explain how the international financial system has fallen into its current troubles. This orientation seems to be a prerequisite to develop a new monetary system which provides the "real" world with stable financial conditions as a basis for a sustained growth of production and trade.

STATISTICAL APPENDIX

The empirical part of this study is to some extent a by-product of a more comprehensive, but mainly inductive investigation about the interaction of the "real" world (production and trade of commodities) and the "monetary/financial" world (production and trade of different kinds of paper), particularly in the early 1980's. Ex post both "worlds" are related through account identities, but ex ante two prices determine the intermediation most: the real interest rate (means of exchange in time) and the real exchange rate (means of exchange across countries). To ensure statistical comparability across countries I have chosen as interest variable the treasury bill rates (if not available the most appropriate substitute). The maturity of three months lies somewhat in between the (short) time horizon of purely financial transactions and the (longer) time horizon of "real" world decisions (esp. investment and international trade).

For the dollar, two interest rates were used, the U.S. treasury bill rate (dollar as national currency) and the Eurodollar rate (dollar as key currency).

Two data tapes provided the statistical basis:

- International Financial Statistics (IMF)

- Main Economic Indicators (OECD)

Exchange rates: IMF (RF-series)

Interest rates

Treasury bill : OECD

Eurodollar : IMF (112/60D)

Consumer prices: OECD

Current account: OECD

Export/import unit values: IMF (201/74D and 75D)

The other data were obtained from the following sources:

Real effective exchange rates: World Financial Markets (Morgan Guaranty Trust)

Purchasing power parity: Statistisches Bundesamt Wiesbaden, Fachserie 17, Verbrauchergeldparitat nach deutschem Schema.

Real interest rates were calculated as the difference between the nominal rate and the CPI-change against previous year.

The weights to calculate the effective exchange rate index of the dollar (geometric mean) as a component of the credit costs for LDC's

were taken from IMF/Directions of Trade (1977) and are as follows (see also footnote 38):

dollar	0.4463
DM	0.1533
franc	0.0901
yen	0.2056
pound	0.1047

The LDC's are defined as the country group 201 in the IMF classification (non-oil developing countries).

FOOTNOTES

1. For a summary see Dornbusch [1980] and Frankel [1983].

2. The PPP condition can be interpreted in two different ways. In one case the exchange rate clears the goods market through commodity arbitrage. In the other case, the exchange rate clears the money (asset) market through the equalization of overall purchasing power.

   The first interpretation corresponds with the flow approach, the second with the asset market approach of exchange rate determination. For a historical review of the different concepts of PPP see Frenkel [1976].

3. Throughout this study variable changes are expressed in discrete form (lower cased) rather than in the conventional log approximation form. I have chosen this method in order to depict more precisely the large variations which have been observed, particularly in the early 1980's.

4. Uncovered interest parity is generally assumed in the asset market models of exchange rate determination. A concrete explanation of the mechanisms of this condition is seldom given. Dornbusch's [1976, p. 1163] initial formulation states that (equation (1) being the uncovered interest parity), "....it is assumed that incipient capital flows will ensure that (1) holds at all times." Concretely, this assumption implies that if the actors in the financial markets realize that the level of domestic interest rates increase relative to the interest level abroad, they expect an incipient capital outflow. This movement will bring about the expected depreciation of the domestic currency and thus equalize capital yields internationally (later he implicitly relaxes this assumption for the first capital flow induced by a change in monetary policy).

5. This is equivalent to the formulation that the forward rate [F(t,t+n)] is the expected value (unbiased predictor) of the future spot rate:

   $$(t)E(t+n) = F(t,t+n)$$

   if covered interest parity holds true then we have:

   $$\frac{F(t,t+n)}{E(t)} = \frac{1 + i(t,t+n)}{1 + i^*(t,t+n)}$$

   Since all variables are known at time t no particular risk is involved in the forward exchange business. We assume therefore that uncovered interest parity holds true due to efficient interest arbitrage (almost by definition since the forward premium/discount is calculated according to the interest differential). The small deviations which count for fluctuating transactions

costs or changing political risk are negligible compared to the huge variations of the spot rate (see Frenkel and Levich [1975, 1977], and Levich [1979]). The foreward rate, F(t,t+n), is certain but the future spot rate is not. Therefore the formation of its expected value, [(t)E(t+n)], does involve risk. The first is brought about by risk averse arbitragers who do not take open positions whereas the latter is formed by speculators who do take open positions. These speculators bear the risk of an uncertain future in the hope of gaining profits from the difference between the forward rate and the future spot rate.

This crucial distinction between arbitrage and speculation was stressed by Aliber in his frequently quoted article on interest rate parity (Aliber [1973]) but has since then been somewhat neglected. Later on one can even find in the literature the expression "uncovered interest arbitrage."

6. The effective dollar rate and the average interest rate on deposits in the 4 other reserve currencies (DM, pound, yen, franc) are calculated using the SDR weights. The maturities are generally 3 months.

7. Empirical studies testing those two conditions have produced some discouraging results. The research on PPP concludes that the "law of one price" is of very limited validity, particularly in the short run (see f.e. Isard [1977]). Most of the tests on uncovered interest parity which covered the period until the mid 1970's could not reject the hypothesis that the interest differential represents an unbiased predictor of the change in the spot rate (for a summary see Levich [1979]). However, most studies which covered the period since 1977 reject the general validity of uncovered interest parity (see, f.e., Cumby and Obstfeld [1981, 1983]; Hansen and Hodrick [1980]).

8. See McKinnon [1981], p. 538.

9. The data for the absolute PPP are published by the Statistisches Bundesamt Wiesbaden (Central Statistical Office of the FRG); interest rates are 3-months maturities, inflation is measured by the CPI. For further details see appendix.

10. Moreover, the monetarist model implies that real interest rates are expected to be equal across countries. However, this has not been confirmed sufficiently by empirical studies (for a more recent study see Merrick and Saunders [1983]). This result is not surprising since the observed differences of real interest rates are rather large (see figure 3) and since one cannot assume people to believe in a relationship which has never been observed in reality.

This theory also conflicts with those (neo-classical) theories of economic growth which relate the real rate of growth to the real rate of interest (as long as real growth rates differ across countries in the short and in the long run which is evidently the case).

11. Frenkel and Mussa [1980].

12. Inclusion of the early 1980's would probably lead to a significant deterioration of the explanatory power of the "news" due to the continuity of exchange rate movements during this period.

13. Flood and Garber [1980, p. 746] define a bubble as follows:

> "A bubble can arise when the actual market price depends positively on its own expected rate of change, as normally occurs in asset markets. ... In such conditions, the arbitrary, self-fulfilling expectation of price changes may drive actual price changes independently of market fundamentals; we refer to such a situation as a price bubble."

14. In a recent paper Dornbusch [1982] mentions that "bubbles" might account for exchange rate deviations from equilibrium. Tobin [1982, p. 126] expresses a "suspicion that a large part of the activity in foreign exchange markets is speculation on future speculation." Both do not offer any concrete evidence.

15. This international interdependence seems to be an important reason for the recent stickyness of U.S. interest rates. All investors would lose considerably if the dollar were to drastically depreciate.

16. It seems therefore very probable that the next dollar depreciation will be very strong once a bandwagon movement out of the dollar has come to start. This would imply heavy losses for most of the asset holders (but would favor the corresponding liability holders like LDC's).

17. To demonstrate concretely what these assumptions imply: If the majority of the actors (measured by "money votes") expect an appreciation then this will occur through the respective capital transactions. Thus the direction of any exchange rate change must have been expected in some way. The extent of the appreciation cannot be "rationally" expected for at least three reasons:

- The individual actors do not quantify exactly their exchange rate expectation (even if they use advisory services which provide them with "precise" forecasts). Once the direction of an exchange rate movement is correctly predicted one gains always (the interest differential is comparatively unimportant for the overall return as diagram 3 of figure 2 shows)

- It is not known how everybody else will react in quantitative terms to changes in expectations (the extent to which he will increase his supply or demand in the foreign exchange market)

- The result of all individual transactions cannot be predicted (particularly since this depends on their concentration in time).

18. Keynes remarks that, "professional investment may be likened to those newspaper competitions in which the competitors have to pick out the six prettiest faces from a hundred photographs, the prize being awarded to the competitor whose choice most nearly corresponds to the average preferences of the competitors as a whole; so that each competitor has to pick, not those faces which he himself finds prettiest, but those which he thinks likeliest to catch the fancy of the other competitors, all of whom are looking at the problem from the same point of view. It is not a case of choosing those which, to the best of one's judgment, are really the prettiest, nor even those which the average opinion genuinely thinks the prettiest. We have reached the third degree where we devote out intelligences to anticipating what the average opinion expects the average opinion to be. And there are some, I believe, who practise the fourth, fifth and higher degrees." (Keynes [1936], p. 156).

The general implications of this "beauty contest" problem in a decentralized market economy are analyzed by Frydman [1982]. He shows that even within the framework of rational expectations models the market process will not converge to the general equilibrium solution "due to the fact that individual agents cannot ascertain the average of forecasts....formed by other agents." (p. 654)

19. Any individual actor in the foreign exchange business has therefore to guess the exchange rate expectation of every other actor. There might be different channels through which the expectations of the financial community are partly harmonized, f.e. the institutional network connecting the Eurobanks to one "community" seems to have become tighter (not only through the traditional links like loan syndication or the inter-bank market but especially under the pressure of common debt management). One phenomenon, which I would like to mention, and which has become more and more important in recent years is the use of charts. Different configurations shall help to predict the dollar exchange rate (see the article by Grover [1983]): the head and shoulders, the rising wedge, the reverse head and shoulders, the falling wedge, the double tops, the broadening top, etc. As the vice-president of the First National Bank of Boston notes: "Even if you don't subscribe to their use, you can't ignore them. Too many traders are using them today" (reformulating precisely Keynes'"beauty contest" problem). This example demonstrates the wide range of possible expectation formations, from those derived from the "true" theory under perfect foresight in the academic world of rational expectations to the "head and shoulders" forecasts of dealers on Wall Street.

20. One can therefore conclude that this approach assumes rational expectations in its weakest possible form: Actors form their expectations according to a general model, but in an uncertain world where the "true" parameters of the model remain quantitatively unknown.

21. The U.S. current account for example did not show a deficit before mid 1982, more than one year after the dollar had crossed the PPP line (taking the relative price level of Germany as a proxy for the rest of the world; a comparison of figure 1 and 2 shows that this assumption is fairly realistic).

22. Dornbusch states that, "Bubbles correspond to a situation where a currency has appreciated beyond what can be considered fundamentals, where an overvaluation is widely thought to prevail, but where continuing appreciation is underway until some disturbance causes the crash. There are no models of the crash as yet but it must be clear that an essential ingredient is the arrival of new information that diverts a sufficient number of speculators from keeping the bubble growing." (Dornbusch [1982], p. 21.)

23. Expectations based on the fundamentals are essential for the initial take off of a bubble process. Once this process has begun, however, the self-fulfilling speculation itself becomes the most dynamic force (even though the fundamentals also exert an influence until the PPP level is reached).

24. For a survey of recent literature see Diba and Grossman [1983].

25. Kouri [1976] gives an additional reason to rule out hyperinflation by the assumption that a minimum stock of real balances is always needed.

26. This occured in September 1981 when the dollar began to depreciate for three months. In the last quarter of 1981 the U.S. current account showed a deficit (for the first time in 5 quarters) and the German current account showed a surplus (for the first time in 10 quarters). At the same time, the level of U.S. interest rates dropped relative to Germany. The combined effect of these changes must have strongly influenced the exchange rate expectations. But from November on U.S. interest rates went up again and the following quarter again showed an active U.S. and a passive German current balance. Thus the process of the dollar appreciation began once again. See also figure 5.

27. The redistribution of the non-wage income is therefore a central element in this analysis. The data for the U.S. seems to support this perception (Economic Report of the President [1983], Tables B-12 and B-21): between 1978 and 1982 the interest income surged by 118.0% whereas total corporate profits fell by 16.2% (the interest which the non-financial corporate business had to pay increased by 96.5%). This type of income redistribution is crucial for any macroeconomic analysis insofar as the propensity to effective demand (investment and consumption) is higher in the case of debitors (which is rather plausible at least in the short run since they would not be debitors otherwise). In an international context LDC's represent the most important category of debitors. Consequently they have contributed most to the growth in world trade during the second half of the 1970's and in particular during the early 1980's until the credit crunch of 1982

(see below).

28. This general analysis seems to explain rather well the most significant trends of the U.S. economy in recent years. It also casts some doubt on the possibility of a sustained recovery as long as the real exchange rate and the real interest rate remain at their high levels (exports and investments are still decreasing).

29. The amplitude of such bubbles might increase in the long run since more and more actors learn the currency game. It seemed as if this game had lost its attractiveness after the German Herstatt Bank and the Franklin National Bank defaulted in 1974 (Solomon [1977], p. 281). However, after a somewhat calm period interest began to expand once again.

30. This development was typical for the second half of the 1970's when the U.S. economy grew faster than most of the other industrialized countries for the first time since the 1950's. Moreover, inflation during this period increased like never before. At that time the real exchange rate and the real interest rate were at their lowest level in post-war history.

31. The disequilibrium approach also explains why econometric estimations of traditional models necessarily produce poor results. The sequence of quasi-equilibria, precarious equilibria and bubbles implies changes in the structure of the model so that constant coefficients cannot be expected (this explains in particular why the econometric results become less satisfying the more recent the sample period used - beginning with the troubles caused during 1978).

32. See for example McKinnon [1981, p. 550] (by the way, the nature of "time zero" seems generally suspect particularly for an economist working in empirical research).

33. In the original aricle by Frenkel [1976, p. 73] I found a footnote on the transition from an orthodox theory (like the flow approach) to a new theory (like the monetarist model) from which I would like to quote a most interesting passage. "A casual reading of many of the popular textbook versions of balance of payments theories suggests, however, that the conditions, outlined by Johnson, for a rapid propagation of a new theory may be satisfied: 'the most helpful circumstances for a rapid propagation of a new and revolutionary theory is the existence of an established orthodoxy which is clearly inconsistent with the most salient facts of reality, and yet is sufficiently confident of its intellectual power to attempt to explain those facts, and in its efforts to do so exposes its incompetence in a ludicrous fashion'." (Quoted from H.G. Johnson's "The Keynesian Revolution and the Monetarist Counterrevolution" (AER 1971, No. 2).

34. This is also reflected by the daily comments found in The Wall Street Journal and The New York Times on the foreign exchange market. They imply always a positive relationship between U.S.

interest rates and the dollar exchange rate. These comments reflect actual habit of expectation formation and strengthens it at the same time.

35. It seems somewhat paradoxical to me that many studies assuming uncovered interest parity make reference to an article by Aliber [1973] which in my reading implies that the expected exchange rate can take any value but the forward rate (as long as an incentive for speculation exists).

36. The assumption that any individual actor expects equalized yields might have been influenced by the rational expectations hypothesis. The fact that this is evidently not the case in the foreign exchange market raises a general question: In traditional market models any individual believes in his chance of being better than somebody else (for example earning higher profits). This stimulates competition and provides the dynamics of the market process. But given market efficiency the aggregate outcome will be equalization through the "invisible hand". If the "hand" now becomes "visible" as assumed by rational expectations models and if therefore everybody already knows the outcome in advance what will happen to the dynamic forces of competition? Since I am not very familiar with rational expectations literature I do not know if this problem has already been tackled. It is related to the problem analyzed by Frydman [1982], but somewhat different.

37. This argument concerns the bubble movement itself. With respect to the turning points and thus the associated profits and losses a (unfortunately less famous) quotation of Lindert and Kindleberger makes a clear point: "To see how little the debate over speculators' profits educates our guesses about their possible destabilizing nature, imagine a 1927 debate over the possibility of destabilizing speculation in stocks on Wall Street. A theorist might have argued, as Friedman did later, that destabilizing speculation would be unprofitable and therefore self-eliminating .... Others might have countered with hypothetical mathematical cases of destabilizing but profitable speculation. None of these contributions, however, could have resolved the key empirical question of whether speculation stands a good chance of being destabilizing in such unregulated markets. That question had to be answered by a study of actual experience. Such a study would have turned up many cases in which sharp changes in price expectations destabilized markets for stocks, tulip bulbs, real estate, and other assets....These destabilizing speculators lost money, of course, but that didn't prevent disaster.

The issue of the likelihood of destabilizing speculation under floating or pegged-but-adjustable exchange rates can thus be judged only empirically, by looking at actual exchange rate experience." (Lindert and Kindleberger [1982], p. 383-384).

It seems to be typical for currency speculation that there are no sudden turning points (crashes) but precarious equilibria between bubble movements. It might therefore be particularly interesting to investigate the distribution of profits/losses

accruing from buying and selling within all speculators (M. Friedman speaks only of the "speculator on the average"). Just to demonstrate that one should not restrict oneself to certain a priori assumptions in this respect, I would like to quote the following passage from an article by Levich [1980, p. 102] (even though there is no direct analogy to the foreign exchange market): " A recent study on the value of information is reported by Lloyd-Davies and Canes (1978). The authors select the Wall Street Journal and its "Heard on the Street" column for their data base. This column summarizes information (for example, earnings estimates, stock price projections) abouth specific firms recently prepared by leading financial analysts. Lloyd-Davies and Canes find that in the twenty days prior to the Wall Street Journal publication there is some small (but significant) price movement in the direction projected by the analyst, but the major (and significant) move comes on the publication date."

38. The basket only includes the most important currencies which are used in international transactions ($, DM, yen, franc, pound). The relative weights of these currencies were approximated by the share of the LDC's exports to each respective country in the overall exports of LDC's (standardized to 1). The fact that many raw material exports are generally priced in dollars does not necessarily bias the calculations since this does not mean that the actual payment was made in dollars. The index overestimates the exchange rate effect since it implies that all the debt of LDC's is denominated in dollars. On the other side the overall credit cost are underestimated since its components were just summed up (instead of multiplying the respective factors) and since the spreads over LIBOR are not included. The fact that approximately 80% of the international assets and liabilities are denominated in dollars so that the currency structure of the capital market does not represent the accumulation of past current account surpluses/deficits is a basic element of the international financial instability. This discrepency seems to be the long-term outcome of U.S. seignorage and the expanding activity in the Euromarkets. This assymmetry between the importance of the dollar in the goods market and in the asset market can be interpreted as a consequence of its double role as a national currency and the key currency for the world economy (see also footnote 43).

39. The exchange rate effect and the terms of trade effect must be clearly distinguished. The first concerns the relative prices between countries to which the LDC's export, whereas the second concerns the relative prices between the LDC's themselves and the rest of the world. However, it is interesting to note that a dollar appreciation usually causes a deterioration of the terms of trade of LDC's as shown by Dornbusch [1982].

40. Recent studies allow for an influence of the current account on exchange rates, f.e. Dornbusch and Fischer [1980]. But they do not consider the current account as representing an autonomous influence of the goods market but rather as a change of net wealth and thus as the first difference of assets/liabilities.

41. It is important to note that this investigation has been restricted to the basic relationships of exchange rates, prices and interest rates. The main reason for this decision to not analyze the exchange rates in a more general macroeconomic framework was to avoid identification problems (there remains no empirical evidence for the general validity of any theory which explains how output, money, interest and prices are interrelated). At the same time, however, this restriction afforded the opportunity to more precisely concentrate on the interaction of the goods and asset market.

42. These relations must not be mistaken for balance of payment identities since they reflect the intended transactions of private actors induced by the relative prices (goods market) and interest rate differentials (asset market). To elaboraee this interaction we assumed implicitly that central banks remain passive (or do not even exist).

43. It is interesting to see how this problem has been handled in practice. The system of "Bretton Woods" could not provide a fundamental solution but rather a pragmatic one. The fixed exchange rates left no incentive for self-fulfilling speculations in "normal" times. But when a currency was considered strongly overvalued (usually caused by a persistently higher inflation; in the case of the dollar this was also due to its role as key currency) and the rumor of an exchange rate adjustment circulated, speculative capital movements took advantage of the open degree of freedom within a usually short period (this happened for the last time in 1973 leading to the definite collapse of the system). During the first phase of the system of floating exchange rates the international financial community had to aquaint itself with the new possibilities in the most riskless way possible. The bank defaults of 1974 can be interpreted as the price of a too bold exploration (this "learning of the community" refers to the important "beauty contest" problem - conspiracies of the gnomes of Zurich are not required in this approach). Since the mid-1970's the movements of short-term capital increased strongly and continuously (comparing the respective figures we can say that those transactions were almost negligible in the 1950's and 1960's). Nowadays, capital transactions amount to 95% of the volume of the foreign exchange market, only 5% are related to the trade of goods and services (Heinemann [1983]). At the same time the whole system became more and more unstable. ("Speculators may do no harm as bubbles on a steady stream of enterprise. But the position is serious when enterprise becomes the bubble in a whirlpool of speculation." Just changing a few words of the next sentence we get: When international trade "becomes a by-product of the activities of a casino, the job is likely to be ill-done," Keynes [1936, p. 159]). But one has still to distinguish between two sub-periods:

- One phase is represented by the capital movements out of the dollar (1977-1980). Since there exists only one key currency

there was no unique alternative for dollar assets. Thus the capital was allocated among different reserve currencies (but mainly in DM assets since Japan and Switzerland restrict capital movements in different ways) and gold. For this reason (and also because of the initial conditions) the speed of the dollar depreciation was much slower than that of the following period of appreciation when capital rushed from the different reserve currencies and gold back into just one currency.

On the real side the dollar depreciation stimulated production and inflation not only in the U.S. but also worldwide for two reasons. First, it favors all international debitors which contribute most to international trade (for they spend more than they earn). Second, the level of interest rates of the key currency has a leading function for the other currencies (with the possible exception of the DM). As far as the world inflation is concerned one should not forget the following fact: both oil price shocks occurred exactly after the two strongest waves of dollar depreciations. Even though this does not explain the entire story it seems important since any dollar depreciation impacts most upon those countries which depend economically on one export good which is exclusively priced in dollars (again a consequence of its role as key currency).

- The second phase focuses on the capital movements into the dollar (1980/82). Both the stimulating effects in the world financial markets and the depressing effects in the world goods market were much stronger than in the period before.

One can therefore conclude that the assymmetry between a depreciation and an appreciation of the dollar stems from its role as the key currency of the world economy.

A further observation seems to confirm the disequilibrium approach. The deviations of the exchange rates from PPP are generally smaller between non-reserve currencies, which usually show relatively high inflation rates (for a similar reason the monetarist model does not conflict with empirical evidence in the case of hyper-inflations).

A recent article by Heinemann [1983] gives a clear picture of how the "mighty dollar" effects both the real and financial side of the world economy (only its effect on the credit costs of LDC's has been neglected). The fundamental problem of the instability of exchange rates in a precarious state of expectation formation is precisely formulated by an international banker. He states, "that while the dollar may be overvalued when measured by the prices of goods that move in world trade, it is not overvalued from the viewpoint of the financial markets." The second part of the quotation confirms the disequilibrium approach. "Indeed, he argues that investors seeking a safe haven from risks in other currencies involved in the international credit crisis could push the dollar still higher." There lies a double story in this statement: First, the currency by far most

involved is the dollar itself and second, a dollar "pushed still higher" makes it absolutely impossible for the LDC's to repay their debt.

But a comment in the daily column of The New York Times on currency markets some days later (June 23, p. D16) confirms the process of expectation formation as hypothesized by the disequilibrium approach:

"Over the last several months, the high level of American interest rates compared with rates elsewhere has made yields of dollar-denominated investments, and hence the dollar, attractive to currency traders. But there are indications that the foreign-exchange markets are beginning to focus more on the widening United States trade deficit than on the level of interest rates, some traders said."

44. The "new classical macroeconomics" for example has nothing to offer with respect to the current problems of the world economy. No solutions are proposed save that of doing nothing. This, however, might represent the trough of a Kontradieff cycle in the history of economic thought which began with the main works of Keynes some 50 years ago. Keynes never offered mathematically consistent models (though a graduate in mathematics) but was a master of discovering inconsistencies in reality. "Unlike physics, for example, such parts of the bare bones of economic theory as are expressible in mathematical form are extremely easy compared with the economic interpretation of the complex and incompletely known facts of experience, and lead one but a very little way toward establishing useful results." (Keynes [1933, p.186] - also the footnote in this passage is interesting). Therefore his proposals were rather pragmatic and useful.

45. The dynamic forces of disequilibria are also covered in the work of those economists who prefer to some extent an inductive approach aiming at a general but also realistic explanation. As probably the best example in the fields of international economics in general and the financial markets in particular see Kindleberger [1969], [1978], [1981].

46. Upon completion of this essay I came across a recent article by Kouri [1983]. His approach offers a dynamic model of exchange rate determination which incorporates the influence of the current account. The basic structure of his "acceleration hypothesis" is clear-cut: "Given the short-run equilibrium value, the exchange rate must change per unit of time in such a way as to equilibrate flow demands for and supplies of foreign exchange derived from capital flows on the one hand and current account transactions on the other. Capital flows are functions of the rate of change of the exchange rate because the stock demand for foreign assets is a function of the level of the exchange rate. Therefore in order for the foreign exchange market to stay in equilibrium, domestic currency must depreciate whenever the current account is in deficit (in excess of 'normal deficit') and appreciate whenever the current account is in surplus (in excess

of 'normal surplus'). The acceleration hypothesis accords well with the behavior of the major currencies in recent years" (Kouri [1983], p. 117-118).

To demonstrate the simplest version of his model concretely, an undervalued currency generates a current account surplus. This is identical with an increase in the stock of foreign assets. Given a stock demand function, the currency must appreciate to clear the asset market (move along the demand function). According to the disequilibrium approach this is a possible but not necessary outcome since ex ante (planned) transactions in the goods market need not equal the (planned) transactions in the asset market. Only ex post does the current account surplus/deficit identically match the change in foreign assets/liabilities. Thus, the exchange rate movements in time can be understood as driven by the interaction of the intended transactions in both, the goods and the asset markets. This perception is similar to the Keynesian explanation of the dynamics of effective demand and output due to the ex ante relation of investment and savings. (The precarious equilibrium for example is somewhat analogous to the Keynesian case of a persistent high unemployment. In both situations the system is in a state of equilibrium but the market of the "fundamentals" - labor in one case, current account in the other - does not clear).

Recent empirical evidence does not seem to confirm the new Kouri approach (see figures 1 and 5): Since for almost one year the U.S. showed a strong deficit in the current account while at the same time the dollar appreciated both in nominal and real terms (the opposite is true in the case of the DM).

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Figure 1

THE DOLLAR AND THE OTHER MOST IMPORTANT RESERVE CURRENCIES

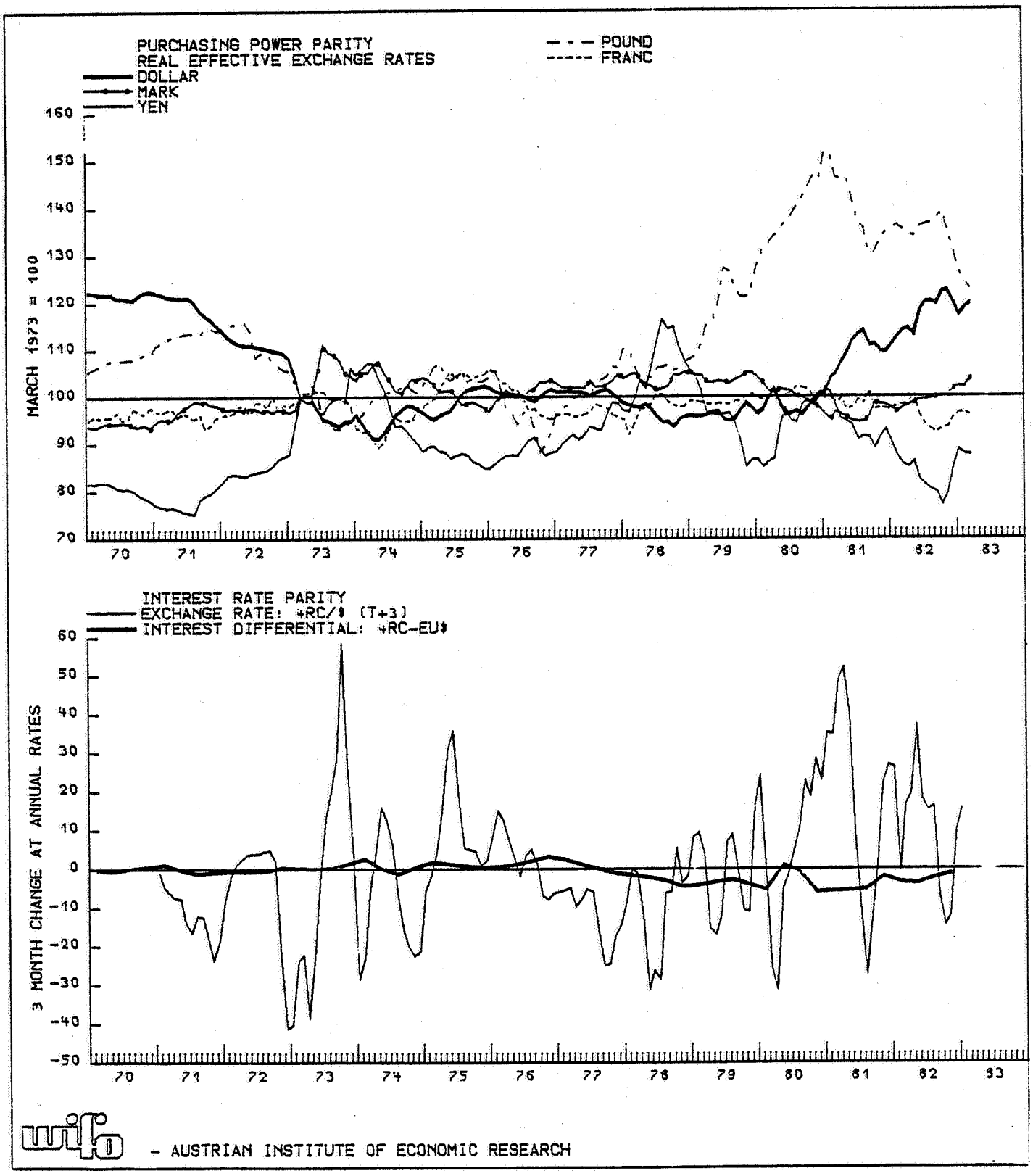

Figure 2

EXCHANGE RATE, INTEREST RATE AND THE PRICE LEVEL

THE RELATION M A R K / DOLLAR

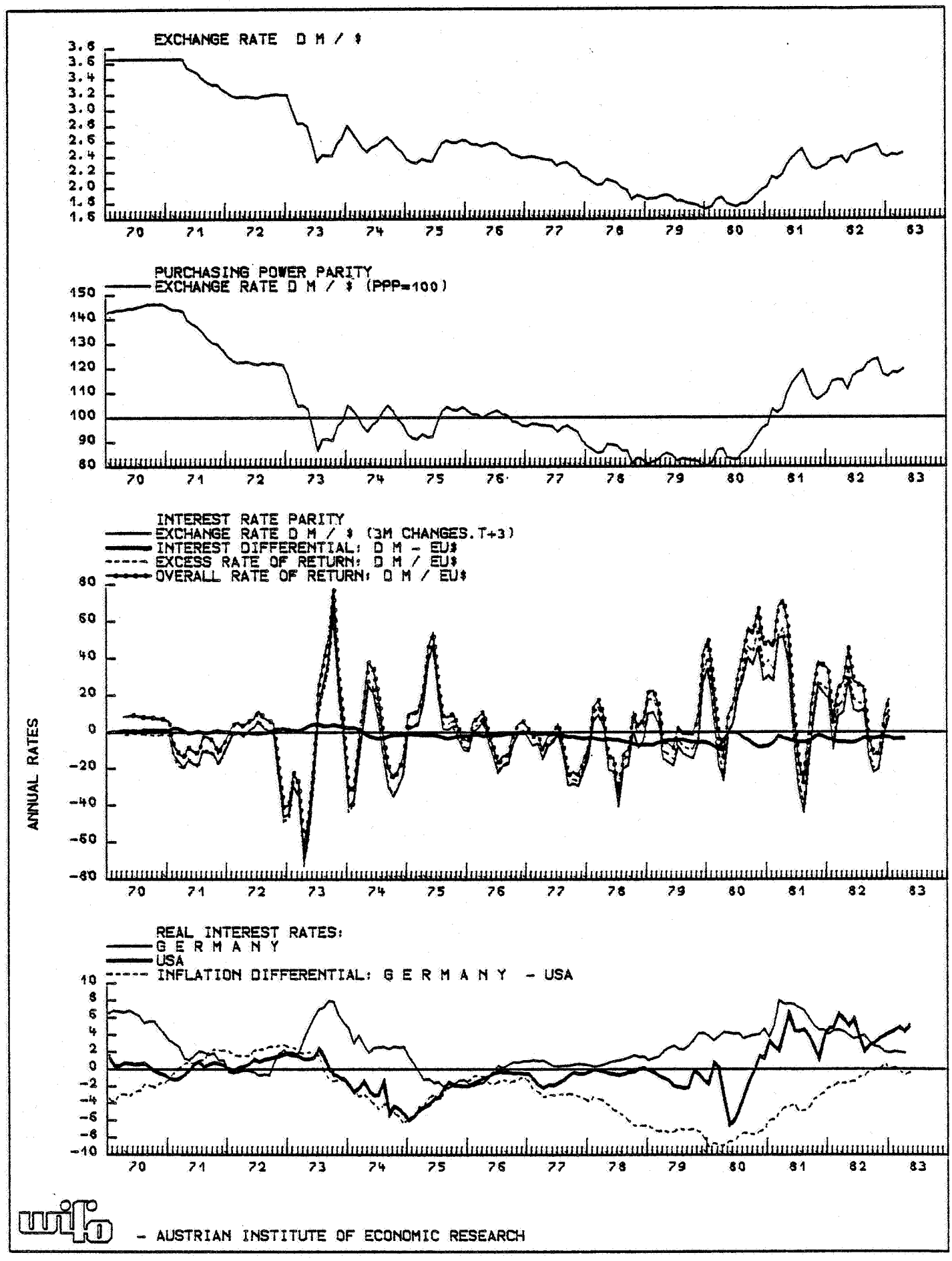

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Figure 3

REAL INTEREST RATE

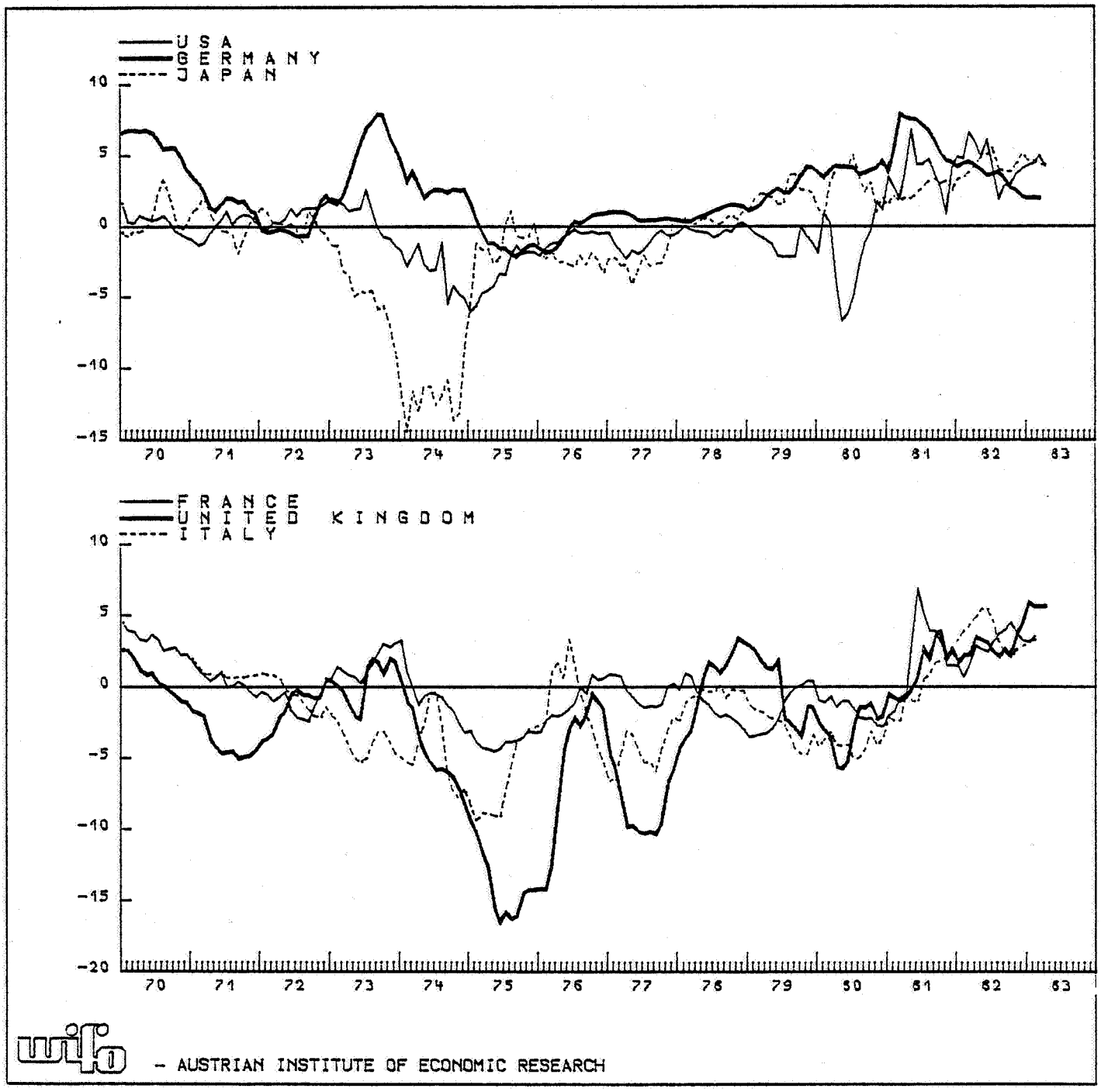

Figure 4

EXCESS RATES OF RETURN

3 MONTH CHANGE AT ANNUAL RATES

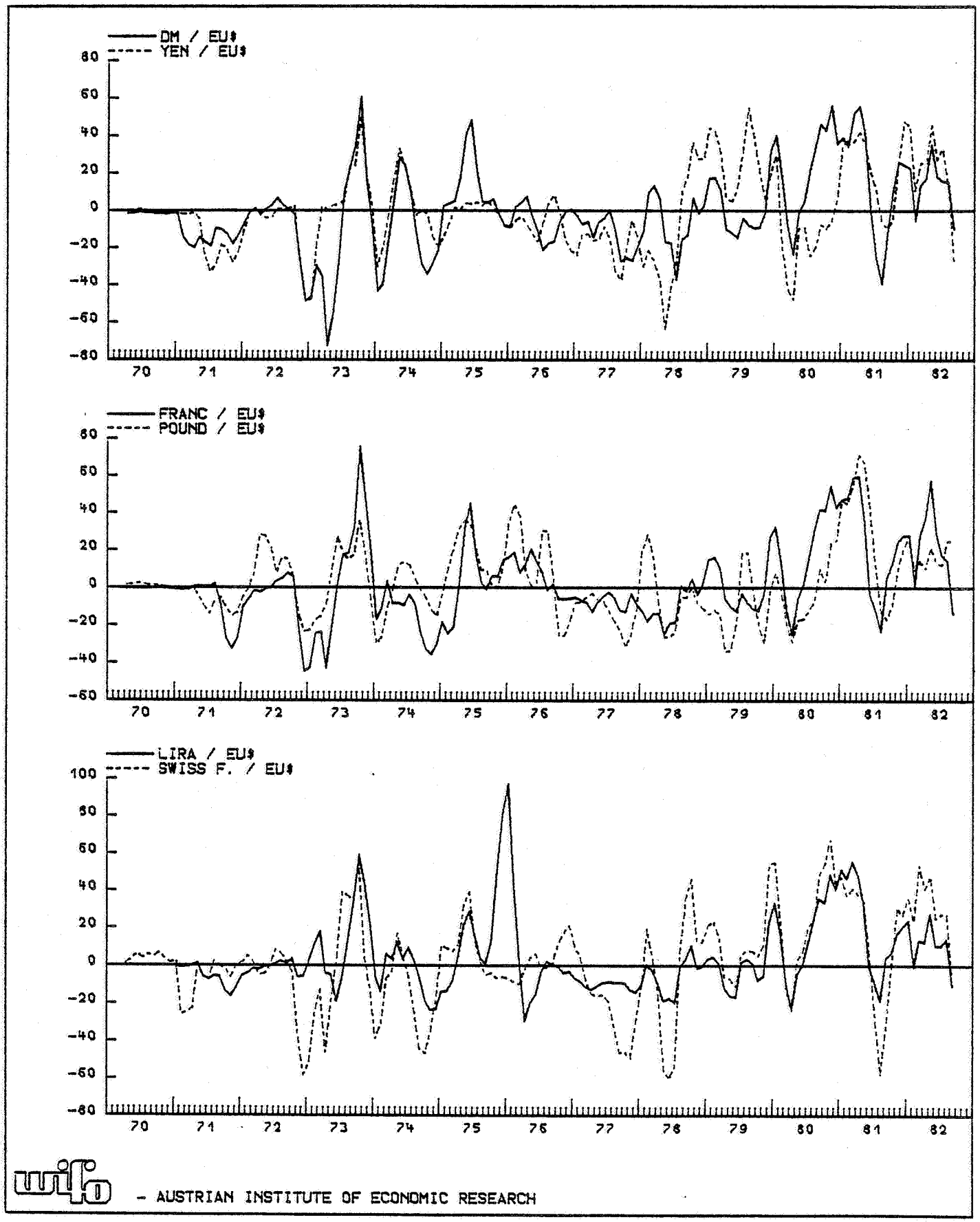

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Figure 5

EXCHANGE RATE, INTEREST RATE AND THE US ECONOMY

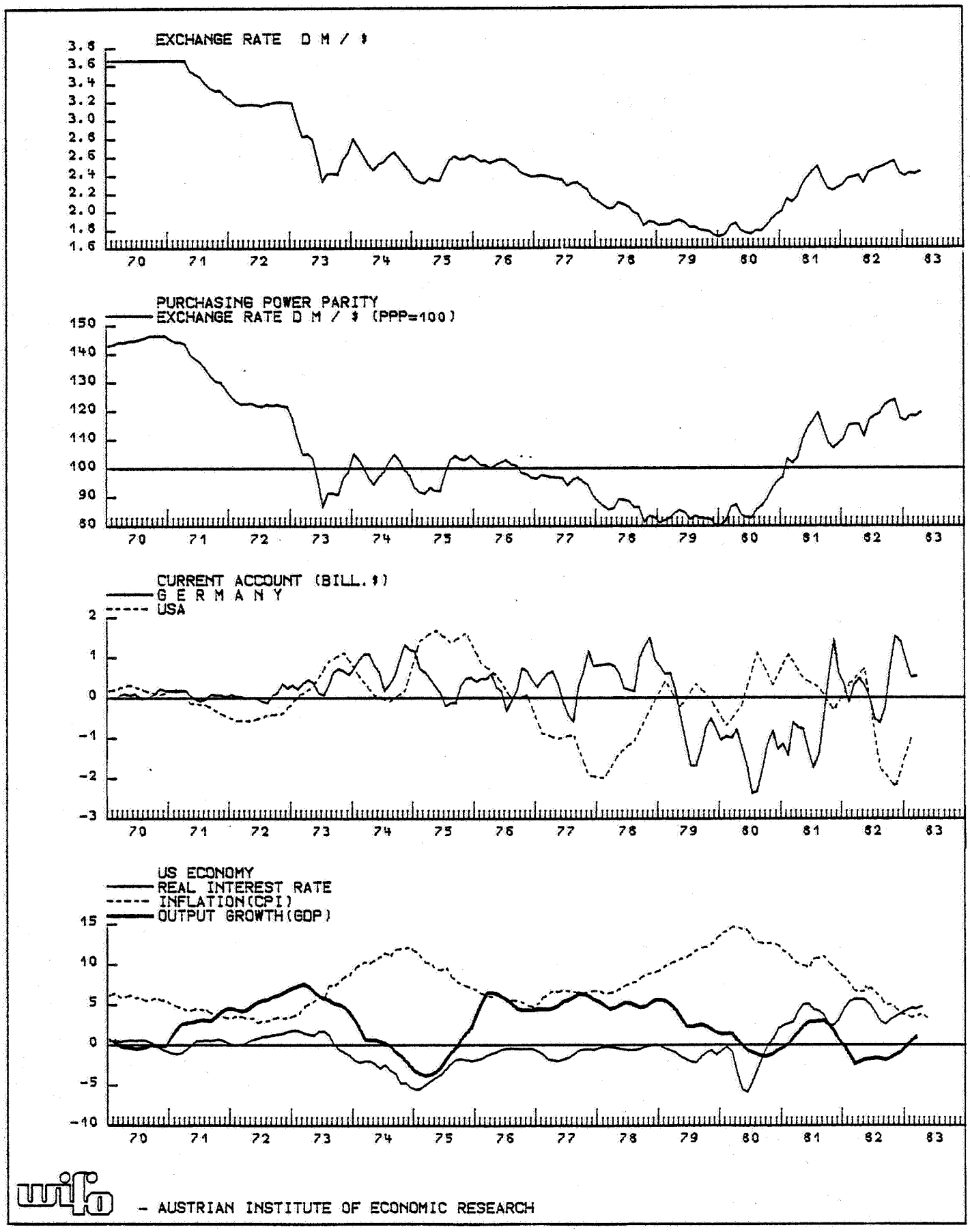

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Figure 6

EXCHANGE RATE, INTEREST RATE AND THE PRICE LEVEL

THE RELATION D O L L A R / MARK

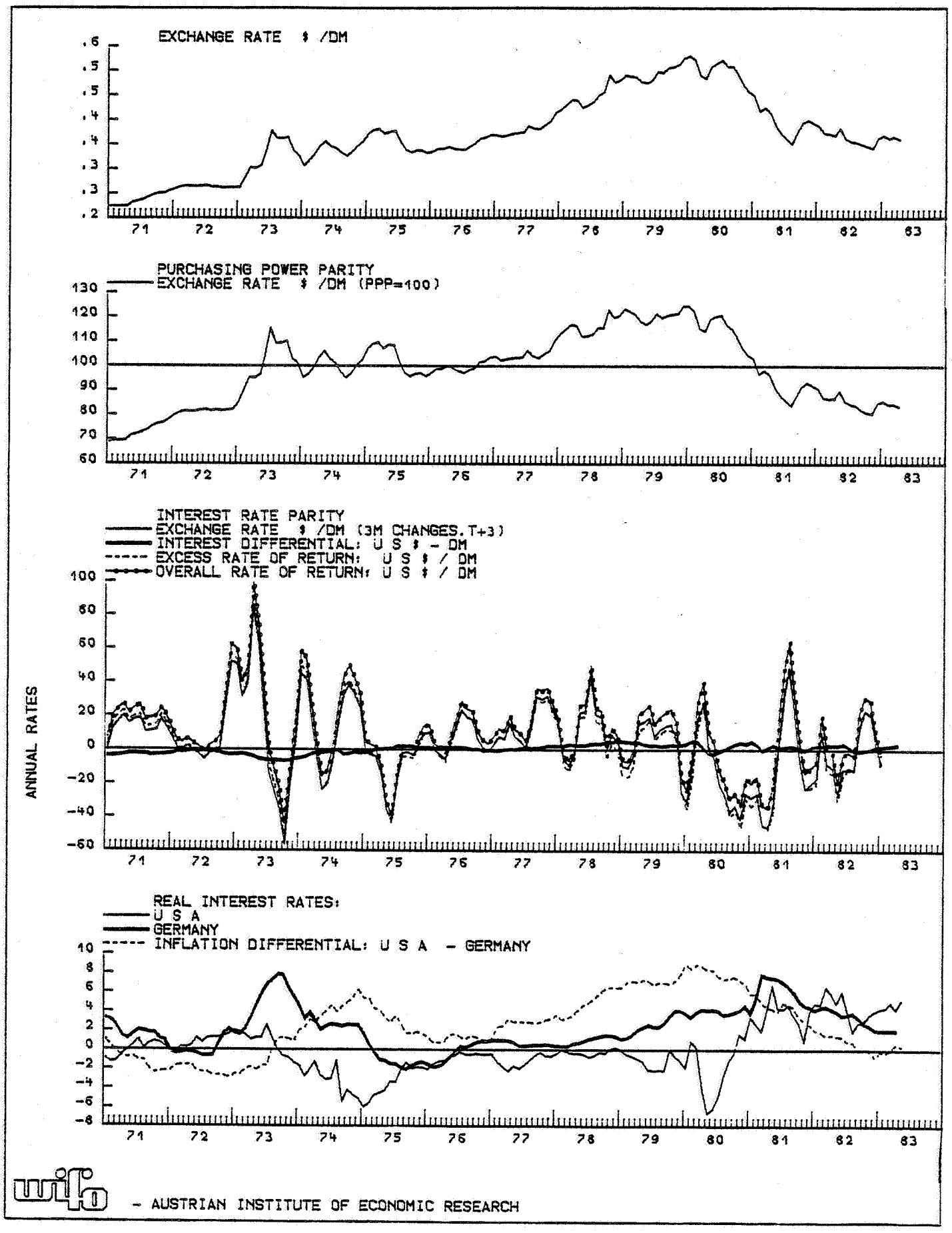

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Figure 7

THE EXCHANGE RATE OF THE DOLLAR AS LIABILITY PRICE

CREDIT COSTS FOR NON-OIL DEVELOPING COUNTRIES