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Managing the Dollar: Has the Plaza Agreement Mattered?

THE AGREEMENT IN SEPTEMBER OF 1985 among the finance ministers and central bankers of the major industrial countries, commonly known as the Plaza Agreement, has been described by some analysts as a watershed in the active management of exchange rates among the industrial countries. Several observers have attributed the dollar's sharp fall in value during 1986–87 and its subsequent stability during 1988 to shifts in policies engineered in the cooperative environment engendered by the Plaza Agreement. For the most part, though, the evidence presented in support of this view, while highly suggestive, has been far from rigorous.¹

In this paper we take a closer look at the question of whether the Plaza Agreement marked a turning point in the policy-making process. We do this by postulating that concern over exchange rates ultimately reflects concern over external imbalances in trade flows. Accordingly, a shift in the policy regime toward one in which governments cooperate in managing currency values should be revealed by a change in the response of exchange rates to news about the trade account. Using a simple open economy model, we characterize the response of exchange rates to unexpected movements in the external balance under a scenario in which the authorities are expected to manage the adjustment of the external balance through the use of

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¹Funabashi (1988) provides a behind-the-scenes account of the attempts by policymakers in the major industrial countries to bring about adjustment of the dollar.

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monetary policies. We find that exchange rates should respond contemporaneously to news of an unexpectedly high or low external balance.²

To test the predictions of the model, we analyze daily data on U.S. dollar exchange rates vis-à-vis the West German deutsche mark and the Japanese yen over the period 1980 to 1988. We employ an event-study methodology in order to determine the response of exchange rates to unexpected movements in the U.S. trade balance. We measure news about the trade balance as the difference between the official monthly figure and forecasts developed by Money Market Services, Inc. The results show that prior to the Plaza Agreement (September 1985) there is no systematic response of dollar exchange rates to unexpected movements in the trade balance, whereas following the Agreement there is a strong contemporaneous response. This evidence, in light of the predictions of our simple model, supports the conclusions of Dominguez (1989) and Obstfeld (1988) that the period following the Plaza Agreement has represented a shift in the policy regime among the industrial countries.³

The paper is organized as follows. Section 1 presents a simple monetary model of the open economy and emphasizes the role of expected future policies in determining the exchange rate. Section 2 briefly describes our empirical methodology and presents our results. The paper concludes with a short summary.

1. TRADE BALANCE ANNOUNCEMENTS AND THE EXCHANGE RATE

This section employs a sticky-price monetary model of exchange rate determination to analyze the effects of trade-balance announcements on exchange rates.⁴ The model is a modified version of the two-country model developed by Frankel (1979) from the small-country model originated by Dornbusch (1976). The model allows the exchange rate to respond to news about the trade balance for a variety of reasons, including the possibility that government authorities alter policy instruments in response to this news in order to bring about desired adjustment in the

²Obstfeld (1988) also emphasizes the role of expectations concerning future monetary policies as a key reason for why the dollar responds strongly to news about the U.S. trade balance.

³Dominguez (1989) and Obstfeld (1988), in surveys of the recent experience with foreign exchange market intervention, report that the volume and frequency of coordinated intervention greatly increased after 1985 for the United States, West Germany, and Japan. Both of these studies, however, emphasize that sterilized intervention has been effective primarily through its use as a signal of coordinated changes in future monetary policies rather than through direct changes in the currency mix of outside assets. This emphasis on the role of expectations concerning future monetary policies is consistent with our premise that expectations about changes in future policies are an important determinant of exchange-rate movements. Dominguez presents the results of econometric tests using daily intervention data which demonstrate the importance of the signaling effect. Her data, however, are confidential and were unavailable for our use.

⁴An alternative framework for analyzing exchange rates is the portfolio balance model which highlights the role of asset accumulation in determining the exchange rate. Empirical tests of the portfolio balance approach, however, have typically found little support in the data (see for example, Frankel 1982). In choosing to use the sticky-price monetary model of exchange rates, we leave aside issues concerning the impact of external imbalances on asset accumulation in determining exchange rates and instead concentrate on the link between external imbalances and the expected reaction of the monetary authorities.

external balance.⁵ Market participants adjust their expectations concerning future monetary policy accordingly when news about the trade balance is revealed, thereby inducing adjustment in the exchange rates and interest rates.

Money market equilibrium in the domestic and foreign countries is assumed to hold continuously:

$$m_t - p_t = -\lambda i_t + y_t \quad (1)$$

$$m_t^* - p_t^* = -\lambda i_t^* + y_t^* \quad (2)$$

where m_t is the logarithm of the domestic money supply, p_t is the logarithm of the domestic price level, i_t is the domestic very short-term interest rate (overnight rate), and y_t captures the effects of real income on money demand.⁶ Equivalent definitions of the variables hold for the foreign country and are denoted by an asterisk. We assume equal interest and income elasticities of money demand in both countries for convenience. Capital mobility links the expected returns on assets denominated in domestic and foreign currencies. We allow for the possibility of a risk premium in the relationship between these returns:

$$E_t e_{t+1} - e_t = i_t - i_t^* + R_t \quad (3)$$

where e_t is the domestic price of foreign currency, R_t is the risk premium on foreign assets relative to domestic assets, and the notation $E_t x_{t+1}$ represents expectation of variable x in period $t + 1$ conditioned on information in period t .

National price levels are assumed to be sticky in the short run and are assumed to adjust only gradually over time in response to conditions of excess demand in goods markets. We assume, however, that in long-run equilibrium, when prices have fully adjusted, the exchange rate equals the difference in national price levels augmented by a term intended to capture shifts in the equilibrium real exchange rate (\bar{q}_t):

$$\bar{e}_t = \bar{p}_t - \bar{p}_t^* + \bar{q}_t \quad (4)$$

where a bar over a variable denotes its long-run equilibrium value.⁷ By substituting for price levels in equation (4) using equations (1) and (2) and substituting for the interest differential using equation (3), we obtain the following relationship:

$$\bar{e}_t = [m_t - m_t^*] + \lambda[E_t \bar{e}_{t+1} - \bar{e}_t] - [y_t - y_t^*] + \bar{q}_t - \lambda R_t \quad (5)$$

⁵In keeping with the essentially descriptive nature of this analysis, we make no attempt to justify the optimality (or lack thereof) of why the authorities desire to target the external balance. Evidence for the industrial countries during the postwar period, however, strongly suggests that this motive is operative (Fieleke 1982; Summers 1988). A more complete analysis, which is beyond the scope of this paper, would be to develop a policy objective function for the authorities that might include additional variables such as output growth and inflation, and then to use this function in determining policy responses.

⁶We assume a unitary elasticity of money demand with respect to income for convenience. Altering this assumption has no qualitative effect on our results.

⁷In allowing for departures from long-run purchasing power parity, our model is similar to frameworks presented by Hooper and Morton (1982) and Obstfeld (1985).

This difference equation can be solved forward, ruling out bubble solutions by assumption, to yield an expression for the long-run equilibrium value of the exchange rate:

$$\bar{e}_t = [1/1 + \lambda] \sum_{i=0}^{\infty} \{[\lambda/1 + \lambda]^i \{E_t M_{t+i} - E_t Y_{t+i} + i + E_t \bar{q}_{t+i} - \lambda E_t R_{t+i}\}\} \quad (6)$$

where $M_{t+i} = m_{t+i} - m_{t+i}^*$ and $Y_{t+i} = y_{t+i} - y_{t+i}^*$. From equation (6), it is apparent that the long-run equilibrium value of the exchange rate will depend on the entire future path of relative money supplies and income levels.

As mentioned above, national price levels are assumed to adjust gradually in the short run in response to the level of excess demand in goods markets, over and above adjustment required by the rates of on-going inflation. This assumption, along with the assumption of rational expectations, has been shown by Frankel (1979) to imply the following relationship:

$$E_t e_{t+1} - e_t = \theta [\bar{e}_t - e_t] + [E_t \bar{e}_{t+1} - \bar{e}_t] \quad (7)$$

where the expected adjustment of the current exchange rate is determined by the difference between the current exchange rate and its equilibrium value (the first term on the right-hand side of equation (7) with θ being a function of the parameters of the model), and by the expected adjustment in the long-run equilibrium exchange itself (second term).⁸ By equating the right-hand sides of equation (7) and equation (3), we obtain the following expression:

$$e_t = \bar{e}_t + [1/\theta] [E_t \bar{e}_{t+1} - \bar{e}_t - R_t - i_t + i_t^*] \quad (8)$$

where the current exchange rate is related to its current and expected long-run equilibrium values, the risk premium, and the interest differential.

We are interested in characterizing the response of the exchange rate after expectations are updated due to an announcement of the trade balance but before any policy change occurs. To do this, we use a subscript t' on variables to denote their value immediately following the announcement of the trade balance. Accordingly, the change in the exchange rate between the period just prior to the announcement and the period just after the announcement is given by $[e_{t'} - e_t]$. Since this time interval is very small (only twenty-four hours for our data set as described in section 2), we assume that factors influencing money demands, such as the real incomes, do not change. Given that any policy-induced changes in money supplies have not yet occurred and that prices are sticky, the constancy of real income implies that interest rates are also unchanged. As a result, equation (8) can be differenced and the change in interest rates set to zero to yield

$$e_{t'} - e_t = \bar{e}_{t'} - \bar{e}_t + [1/\theta] \{ [E_{t'} \bar{e}_{t+1} - \bar{e}_{t'}] - [E_t \bar{e}_{t+1} - \bar{e}_t] - [R_{t'} - R_t] \} . \quad (9)$$

⁸It should be noted that the relationship given in equation (7) rules out explosive solutions by assumption.

By using equation (5), we can derive an expression for the change in the expected long-run equilibrium rate of depreciation:

$$\begin{aligned} & \{[E_{t'}\bar{e}_{t+1} - \bar{e}_{t'}] - [E_t\bar{e}_{t+1} - \bar{e}_t]\} = \\ & [1/\lambda]\{[\bar{e}_{t'} - \bar{e}_t] - [\bar{q}_{t'} - \bar{q}_t]\} + [R_{t'} - R_t] \end{aligned} \quad (10)$$

where we have made use of the fact that there is no change in real incomes or money supplies during the interval between the period prior to the announcement and the period following the announcement. We can use equation (10) to substitute for the expected long-run equilibrium rate of depreciation in equation (9), and rearrange, to obtain

$$e_{t'} - e_t = [1 + 1/\lambda\theta][\bar{e}_{t'} - \bar{e}_t] - [1/\lambda\theta][\bar{q}_{t'} - \bar{q}_t]. \quad (11)$$

Finally, substituting for $[\bar{e}_{t'} - \bar{e}_t]$ in equation (11) using equation (6) yields

$$\begin{aligned} e_{t'} - e_t = & [1 + 1/\lambda\theta][1/1 + \lambda] \Sigma [\lambda/1 + \lambda]\{[E_{t'}M_{t+i} - E_tM_{t+i}] \\ & - [E_{t'}Y_{t+i} - E_tY_{t+i}] + [E_{t'}\bar{q}_{t+i} - E_t\bar{q}_{t+i}] \\ & - \lambda[E_{t'}R_{t+i} - E_tR_{t+i}]\} + \lambda[\theta - 1]/\{[1 + \lambda]\lambda\theta\}[\bar{q}_{t'} - \bar{q}_t] \\ & - [\lambda\theta + 1]/[1 + \lambda]\theta[R_{t'} - R_t] \end{aligned} \quad (12)$$

where the change in the exchange rate is related to changes in the expected future paths of relative money supplies, relative real incomes, the equilibrium real exchange rate, and the risk premium, as well as changes in the current equilibrium real exchange rate and the current period risk premium.⁹

Equation (12) relates the change in the spot exchange rate between the time immediately before and immediately after the trade balance announcement to changes in the current and expected future values of fundamentals. New information concerning the trade balance could affect both current and expected future values of the fundamentals, thereby requiring adjustment in the current exchange rate. If the channel through which new information affects the exchange rate is the current and/or the expected future values of the risk premium or the equilibrium real exchange rate, the response of the exchange rate to trade balance announcements should be observed throughout our sample period. On the other hand, if the channel of transmission involves the coordinated reaction of future monetary policies, then the response of the exchange rate to trade balance announcements should be observed only during episodes of coordination.¹⁰

⁹Once again we have made use of the fact that there is no change in the current values of money supplies or real incomes during the interval of time between t and t' .

¹⁰Note that if policymakers are expected to alter fiscal policies in response to news about the trade balance, the expected future real exchange rate would change and this in turn would alter the current

The hypothesis that we test below is that the Plaza Agreement of September 1985 marked a change in policy regime toward one in which policies are coordinated so as to promote adjustment of the U.S. external deficit. Under this hypothesis, we should observe a break in the relationship between dollar exchange rates and U.S. trade balance announcements shortly after September 1985. Our ability to distinguish this policy-related break in the data is, however, obviously limited if information about the trade balance also affects expectations about fundamentals other than policies in a way that differs significantly across the two subperiods.

2. EMPIRICAL RESULTS

A. Methodology

We employ an event-study methodology to examine how the foreign exchange market reacts to the release of information concerning the aggregate U.S. trade balance. We compute the information contained in an announcement of the trade balance as the difference between the announced dollar value of the trade balance and the expectation held by market participants prior to the announcement. Our approach is similar to previous studies that have considered how announcements of economic data affect financial market variables.¹¹

The intent of event studies is to restrict the change in information to the release of recent news. We assume that the current spot exchange rate, e_t , incorporates all information available at time t . If, however, new information arrives about some relevant state variable x_t , this will be incorporated into market rates:

$$e_{t'} - e_t = \alpha + \beta[x_t - E_{t-1}x_t] + \epsilon_t \quad (13)$$

where ϵ_t is a white noise error term. Our test of the effect of economic policy on the exchange rate centers on equation (13), which we will estimate for the subperiods before and after the Plaza Agreement. If our hypothesis is correct, α and β will differ across these subperiods.

B. Data

Implementing equation (13) is straightforward, apart from finding a proxy for market expectations. We chose to use forecasts of the overall U.S. trade balance measured in dollars as developed by Money Market Services, Inc., a private firm that polls market participants. Alternatively, we could have used an ARMA model

nominal exchange rate. Accordingly, our results reported below are consistent with the possibility that fiscal policies are employed to adjust the external balance. Our reason for focusing in the text on the expected change in future monetary policies is that the accepted view concerning the post-Plaza period, as documented in Funabashi (1988) and Obstfeld (1988), emphasizes shifts in monetary policies rather than fiscal policies as the primary force moving exchange rates. To quote Obstfeld (1988, p. 56), "Shifting fiscal trends contributed to the dollar's fall from its peak of early 1985, but it is monetary policy that has been the more important instrument of medium-term exchange-rate management."

¹¹See, for example, papers by Cornell (1982), Engel and Frankel (1984), and Hardouvelis (1988).

to develop a monthly forecast series for the trade balance. This approach, however, would only incorporate information available one month before the announcement and would ignore important information like the money supply that is available on a weekly basis. As we show below, the Money Market Services forecast is superior to an ARMA forecast on the basis of mean squared error.

Money Market Services polls currency traders in the week prior to the release of the trade figures. Money Market Services does not divulge individual forecasts, but they do provide the survey median. We have data on the median forecast for the period January 1980 to April 1988, totaling one hundred monthly observations.

Money Market Services provides forecasts only of the trade balance on a multi-lateral basis, so we chose to look at data for two of the most important parties to the Plaza Agreement, Japan and West Germany.¹² We use data for the U.S. dollar's exchange value against the Japanese yen and the West German deutsche mark obtained from bid quotations in the New York market. The change in the exchange rate is computed as the difference between its value at 4:00 P.M. the day before the announcement and its value at 4:00 P.M. the day of the announcement.¹³

Before turning to the event studies, we wanted to check the unbiasedness and orthogonality of the forecasts from Money Market Services. Testing for unbiasedness will help us to know whether the forecasts systematically deviate from the actual trade figures. Orthogonality is a test of market efficiency. We want to determine whether publicly available information at the time of the announcement was incorporated into the forecast.

Following Grossman (1981), we first regressed the actual monthly trade balance series, x_t , on the forecast, $E_{t-1}x_t$:

$$x_t = -0.583 + 0.969[E_{t-1}x_t] \quad R^2 = 0.85 \quad F(0,1) = 3.439$$

(0.386) (0.041) (14)

where standard errors are in parentheses. The constant term is not significantly different from zero and the slope term is not significantly different from unity at standard levels of significance. An F -test on this joint hypothesis rejects the null at the 5 percent level, but not at the 1 percent level. These statistics strongly support the view that the Money Market Services forecasts of the trade balance are unbiased.

Second, also following Grossman (1981), we tested orthogonality in two different ways. One test involved fitting an AR(2) model for the trade balance to the first

¹²Accordingly, the unexpected component series used in the regressions reported below is for the multilateral U.S. trade balance. We believe, however, that news about the multilateral balance is relevant for policy decisions concerning the bilateral exchange rates with Japan and West German, the two countries with which the United States has its largest bilateral trade deficits. Our reason is that the multilateral imbalance gets the attention of the media and protectionists in Congress, but that solutions are typically aimed at the countries with the largest imbalances.

¹³The announced value of the trade balance used in constructing the unexpected component series is the initial announcement made by the U.S. Commerce Department, not the subsequent revision. From January 1980 to November 1983, the trade-balance data were released at 2:30 p.m. From December 1983 on, the data were released at 8:30 a.m.

sixty observations to determine if a naive time series model could outperform the survey forecasts:

$$x_t = -0.587 + 0.382 x_{t-1} + 0.520 x_{t-2} \quad R^2 = 0.681$$

$$(0.477) \quad (0.116) \quad (0.118) \quad (15)$$

Although this model fits the data well, the squared forecast error for the Money Market Survey over the last forty observations, 4.909, is a third lower than the value for the AR(2), 7.143.

The second test involved determining whether publicly available information was fully incorporated into the Money Market Services forecast of the trade balance. Since an important policy tool for influencing currency values is the money supply, we chose to see whether the forecast error for the trade balance was orthogonal to the money supply figures (M1) released during the week prior to the trade balance announcement. These data on the money supply were also provided by Money Market Services and were only available through September 1987, requiring dropping the last nine observations. We regressed the forecast error for the trade balance on a constant term and the previous week's money supply:

$$[x_t - E_{t-1}x_t] = -0.250 - 0.000 M_{t-1}$$

$$(1.019) \quad (0.001)$$

$$R^2 = -0.010 \quad F = 0.021 \quad (16)$$

where M_{t-1} is the M1 definition of the money supply. The results show that the money supply has no ability to explain the forecast error. This strongly suggests that the Money Market Services forecast is efficient.

C. Results by Subperiod

Table 1 presents regressions of the change in the dollar's exchange value on a constant term and the unexpected component of the trade balance. We chose to split the sample between February and March 1986 on the basis of a moving sample Chow test for structural stability.¹⁴ The local peak for the Chow statistic for both the yen and the deutsche mark occurs in March 1986. Although this represents a lag of five months from the actual agreement in September 1985, it is consistent with the view that a change in the policy regime requires some time to become credible to market participants. We tested the sensitivity of our results by also estimating the

¹⁴The statistic computed was $F_t = [(\epsilon'_t \epsilon_t - (\epsilon'_1 \epsilon_1 + \epsilon'_2 \epsilon_2))/k] / [(\epsilon'_1 \epsilon_1 + \epsilon'_2 \epsilon_2)/(n_1 + n_2 - 2k)]$, where $\epsilon'_t \epsilon_t$ is the sum of squared residuals from the surprise regression for the whole sample ($\tau = T$), for regime one ($\tau = 1$), for regime two ($\tau = 2$); and where $(n_1 + n_2)$ equals the sample size, and k equals the number of parameters estimated.

TABLE 1
EXCHANGE RATES AND TRADE BALANCE ANNOUNCEMENTS

Dependent Variable	Unexpected Component of Trade Balance	Time Period	\bar{R}^2
Dollar Price of Yen	-0.329 (0.421)	80:1-86:2	-0.005
	-3.793 (0.917)	86:3-88:4	0.392
Dollar Price of Deutsche Mark	-0.444 (0.375)	80:1-86:2	0.005
	-3.826 (0.860)	86:3-88:4	0.429

NOTE: Dependent variable is measured as the log difference of the exchange rate. Independent variable is the announced trade surplus minus the forecast trade surplus, measured in billions of dollars. All reported coefficients and standard errors (in parentheses) are equal to their actual values multiplied by 10³. A constant term was included in the regressions but is not reported here.

regressions over subsamples split between September and October of 1985. The results were virtually identical to those reported in Table 1.

For the earlier period, we can not reject the hypothesis that the coefficient on the unexpected component of the trade balance is equal to zero.¹⁵ For the latter period, though, the coefficient on the unexpected component of the trade balance has the correct (negative) sign and is significantly different from zero at standard levels. The regressions explain 39 percent and 42 percent, respectively, of the variation in the yen and deutsche mark rates over the period March 1986 through April 1988, a remarkably large amount for an event study. Our estimates suggest that a surprise increase of \$3 billion in the monthly trade deficit appreciates the yen and the deutsche mark by approximately 1 percent in value against the U.S. dollar. The shift from an episode during which the dollar does not respond at all to information about the trade balance to one in which it does respond, is consistent with the hypothesis that the Plaza agreement marked a turning point in the coordination of economic policies.¹⁶

3. SUMMARY

This paper has considered whether the agreement in September 1985 among the finance ministers and central bankers of the major industrial countries, commonly known as the Plaza Agreement, represented a fundamental shift in the exchange-rate policy regime of these countries. Using a simple two-country model of the open economy, we were able to isolate the response of the exchange rate to news about the trade balance under the assumption that policymakers are expected to manage

¹⁵Our finding that the U.S. dollar's exchange value does not respond to trade balance announcements during the earlier subsample is consistent with Hardouvelis (1988) who examined data only through 1984 and found no effects from trade balance announcements on the dollar's value.

¹⁶We make no judgment here on the question of whether policy coordination aimed at stabilizing nominal exchange rates is desirable. See Feldstein (1989) for a discussion of the potentially harmful effects of using monetary policies to stabilize nominal exchange rates. In addition, we acknowledge that our results, though consistent with the hypothesis of a monetary policy regime shift, may also be consistent with alternative hypotheses concerning the effects of regime shifts in fiscal or other policies.

adjustment of external imbalances through the use of monetary policies. From our empirical analysis we found a strong relationship between exchange rates and news about the trade balance during the period after the Plaza agreement, but found no relationship at all during the period preceding the agreement. This evidence suggest to us that the Plaza agreement represented a shift in the policy regime among the industrial countries toward a more active stance in managing external imbalances through policy coordination.

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