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Foreign Investment in U.S. Cropland

Some Evidence on the Role of Exchange Rates, Interest Rates, and Returns on Cropland

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Abstract

This paper empirically examines the role of exchange rates, cropland returns, and the real interest rate as determinants of foreign investment in U.S. cropland. Investments from the top six countries of origin were analyzed. Investments from Mexico were also examined because of that country's close physical proximity to the United States. The evidence presented suggests that foreign investment in U.S. cropland is negatively related to the value of the dollar and the level of U.S. real interest rates, and positively related to returns on U.S. cropland.

Keywords: Foreign investment, cropland, interest rates, exchange rates, cropland returns.

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Contents

	Page
Introduction	1
Background	1
Determinants of Foreign Investment	2
Empirical Evidence	3
Summary and Conclusions	11
References	13

Foreign Investment in U.S. Cropland

Some Evidence on the Role of Exchange Rates, Interest Rates, and Returns on Cropland

John Kitchen
J. Peter DeBraal

Introduction

In the 1970s, Federal and State agricultural policymakers became concerned about the prospect of foreigners owning a large and increasing proportion of U.S. agricultural land. However, because of a lack of data on foreign holdings, the extent of foreign holdings was unknown. As a result, the Agricultural Foreign Investment Disclosure Act of 1978 was passed. The legislation requires all foreign owners of U.S. agricultural land (farm and forest lands) to submit reports to the Secretary of Agriculture detailing, among other things, the amount of agricultural acreage they own.

The resulting data set of monthly observations on foreign acquisition and disposition of U.S. agricultural land provided a unique opportunity to examine whether foreign investment activity conformed to sensible economic relationships. The monthly periodicity of the acquisition and disposition data presented special problems, however, as potentially important explanatory variables were available only at a longer periodicity. One such key variable is the price of land which was not available at a monthly periodicity. As a result, we chose to treat relevant financial and price data as information variables, and then examine whether foreign net acquisitions responded to the information carried in the variables in a fashion consistent with hypotheses suggested by economic theory. The research reported here is a first attempt to provide empirical evidence about the determinants of foreign investment in U.S. cropland.

Background

As of December 31, 1987, foreigners reported that they owned 12.5 million acres of U.S. agricultural land. This represents slightly less than 1 percent of the 1.29 billion acres of privately owned U.S. agricultural land and approximately 0.6 percent of the 2.27 billion acres that comprise the United States.

Although foreign buyers come from all over the world, 73 percent of the acreage is owned by foreign persons from the United Kingdom, Canada, West Germany, the Netherlands Antilles, the Netherlands, and Switzerland. Investors from the United Kingdom lead the list, accounting for 30 percent of the foreign-held acreage. At the other extreme, the Japanese hold only 1.2 percent of the foreign-held acreage.

Table 1 presents information on the characteristics of foreign owners of U.S. agricultural land. Individuals are the most common type of foreign owner of U.S. agricultural land, accounting for 44 percent of the owners. Corporations account for 39 percent and partnerships account for 13 percent. The size of corporate holdings tends to be much larger, however, and corporations own 80 percent of the foreign-owned agricultural land. Partnerships own 14 percent and individuals own only 8 percent.

Of the countries examined, the Netherlands Antilles represents a special case. This small Caribbean country offers secrecy to persons of any nationality who conduct their business there and, until 1985, offered potential tax advantages for investments in the United States. Most of the investment in U.S. agricultural land coming from the Netherlands Antilles undoubtedly originates in other countries. However, these investments frequently cannot be traced back to the ultimate investor because of the secrecy laws in the Netherlands Antilles and because of the frequent practice of issuing shares in the Netherlands Antilles in bearer form. That is, the shares are issued to "Bearer" and they are redeemable upon presentation by the holder; the shares are essentially as transferable as currency.

We chose to confine our investigation to investments in cropland because of noticeable period-to-period fluctuations in the total figures for foreign-owned agricultural land that are directly attributable to investment decisions by large investors in the timber sector.

Determinants of Foreign Investment

There are various factors that affect foreign investment in U.S. assets. The exchange rate is critically important in an international setting. For example, the price of a U.S. asset to a foreign investor, P*(t), can be written as:

$$P^*(t) = E(t)\ P(t)$$

where E(t) is the exchange rate expressed as the foreign currency price of the U.S. dollar and P(t) is the dollar price of the U.S. asset. As the exchange

Table 1--U.S. agricultural landholdings by type of foreign owner, December 31, 1987

Owner	Owners	Acres
	Number	
Individual	3,438	989,390
Corporation	3,064	10,058,298
Partnership	1,054	1,291,562
Other	280	195,722
Total	7,836	12,534,972

Source: DeBraal (1988).

value of the dollar rises (an increase in E(t)), the cost to the foreign investor in terms of the foreign currency increases. Hence, foreign demand for U.S. assets shifts back as the exchange value of the dollar rises. The foreign investor must also consider relative rates of return among various U.S. assets. For example, as returns to cropland fall relative to those of alternative investments, there would be less investment in--or even disposition of--cropland.

Kahley (1987) provides a discussion of foreign investment activity and a review of the theoretical and empirical literature. The following passage summarizing Hymer's (1960) contributions is of particular relevance for our study:

> For individuals, the main determinants of "portfolio" investment decisions are the expected rate of return and the investment risk. Corporations, however, are likely to concentrate on the profitability or return on investment over the medium or long term. Within this time frame, many industry specific-factors may combine to influence events (Kahley, p. 39).

With the predominant role of corporations in foreign investment in agricultural land as revealed in table 1, returns to cropland could be a key factor explaining foreign investment in agricultural land.

A decade ago, tax advantages were also frequently cited as a reason for foreign investment in U.S. real estate. Prior to June 18, 1980, foreign investors were able to use a number of legally permissible techniques to avoid paying capital gains taxes on the sale of their U.S. real estate holdings. In the case of the Netherlands Antilles and some other countries, the capital gains tax advantages were also enhanced by treaty provisions. Such advantages led to the passage of the Foreign Investment in Real Property Tax Act of 1980 (FIRPTA). The FIRPTA foreclosed most of the tax avoidance techniques and directed that those treaties securing tax advantages be renegotiated by December 31, 1984. Failing such renegotiation, the legislation superseded the tax treaties. Hence, the foreign investor does not presently have a significant tax advantage. To the extent that the foreign investor is doing business in the United States, the investor is generally subject to the same income tax rates as U.S. taxpayers. The foreign investor may, however, have home-country tax advantages of lower income taxes or no income taxes.

Empirical Evidence

Data on foreign acquisitions and dispositions of various land-use categories of U.S. agricultural land were available at a monthly periodicity by country from 1981 through 1987. We chose to examine the countries with the largest holdings, the greater amount of acquisition and disposition activity, and a close physical proximity to the United States. These criteria lead to the selection of Canada, Mexico, the Netherlands, the Netherlands Antilles, Switzerland, the United Kingdom, and West Germany. Also, we chose to concentrate on a well-defined component of U.S. agricultural land; the acquisition data used in the estimations were for U.S. cropland.

Using a reduced form and assuming a log-linear relationship, we performed regressions based on the following specification:

$$A_i(t) = a_i + b_i \ln X_i(t) + c_i \ln W(t) + d_i R(t) + e_i(t) \quad (1)$$

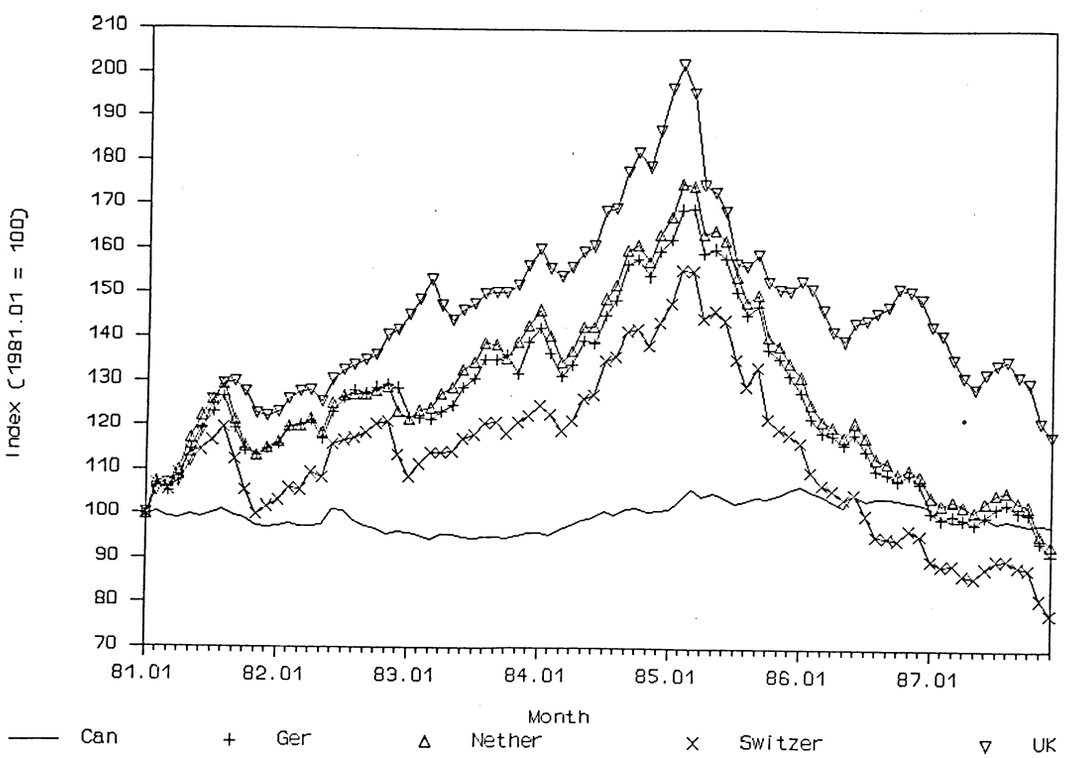
where $A_i(t)$ is net acquisitions of U.S. cropland by foreign country i, ln represents the natural logarithm, $X_i(t)$ is the real exchange rate between country i and the United States, W(t) is returns to U.S. cropland, R(t) is the U.S. real interest rate, a_i, b_i, c_i, and d_i are coefficients to be estimated for each country case, and $e_i(t)$ is a country-specific error term. The net acquisition term, $A_i(t)$, is defined as the natural logarithm of the current period investment level less the logarithm of the previous period investment level. Hence, it is approximately the percentage change in (e.g. flow of) foreign investment in U.S. cropland for country i.

Exchange rate data for the countries we examined were readily available for the monthly periodicity. We used wholesale or producer price indexes of the United States and the relevant country to convert nominal exchange rates to real exchange rates:

$$X_i(t) = \frac{E_i(t)I(t)}{I_i(t)}$$

where $E_i(t)$ is the nominal exchange rate (foreign currency price of the dollar), I(t) is the U.S. producer price index, and $I_i(t)$ is the price index for country i. Figure 1 shows bilateral real exchange rate measures (foreign

Figure 1--Real exchange rates, exchange value of the dollar



currency value of the U.S. dollar) for Canada, the Netherlands, Switzerland, the United Kingdom, and West Germany. The close relationship between the exchange rate series for the Netherlands and for West Germany is due to those countries' participation in the European Monetary System (EMS). The EMS establishes intervention bands that keep the relative value of member currencies stable. Figure 2 shows the real exchange rate for the Mexican peso price of the U.S dollar. Data for the Mexico-U.S. exchange rate were available only through September 1985. Mexico's role as a lesser developed nation and the instability of its financial system are evident through the higher volatility of its real exchange rate.

As a proxy for the returns variable, we constructed a ratio of prices received to prices paid by farmers. We used the index for prices received by farmers for all crops and the index for prices paid by farmers for production items, interest, taxes, and wage rates (see Annual Price Summary (1987)):

$$W(t) = \frac{PR(t)}{PP(t)}$$

where PR(t) is price received on crops and PP(t) is the prices paid variable. Figure 3 shows the W(t) series.

The U.S. real interest rate series is shown in figure 4. The real interest rate was calculated as the difference between the treasury bond rate and the

Figure 2--Real exchange rate, Mexico-U.S.

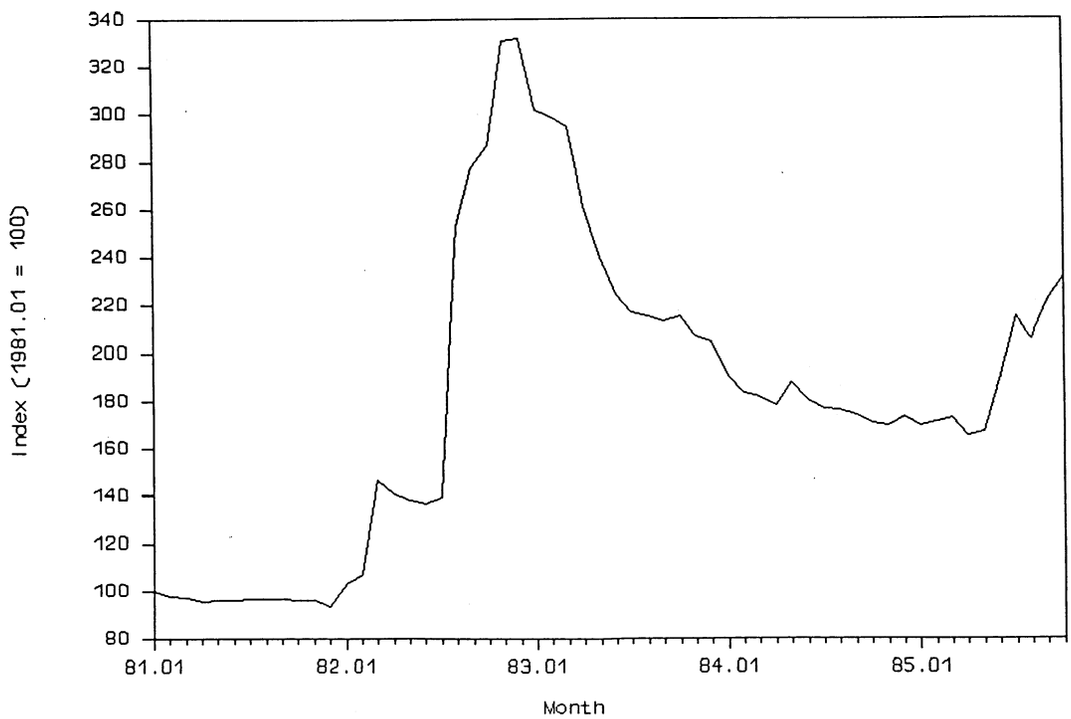


Figure 3--Ratio of prices received to prices paid by farmers

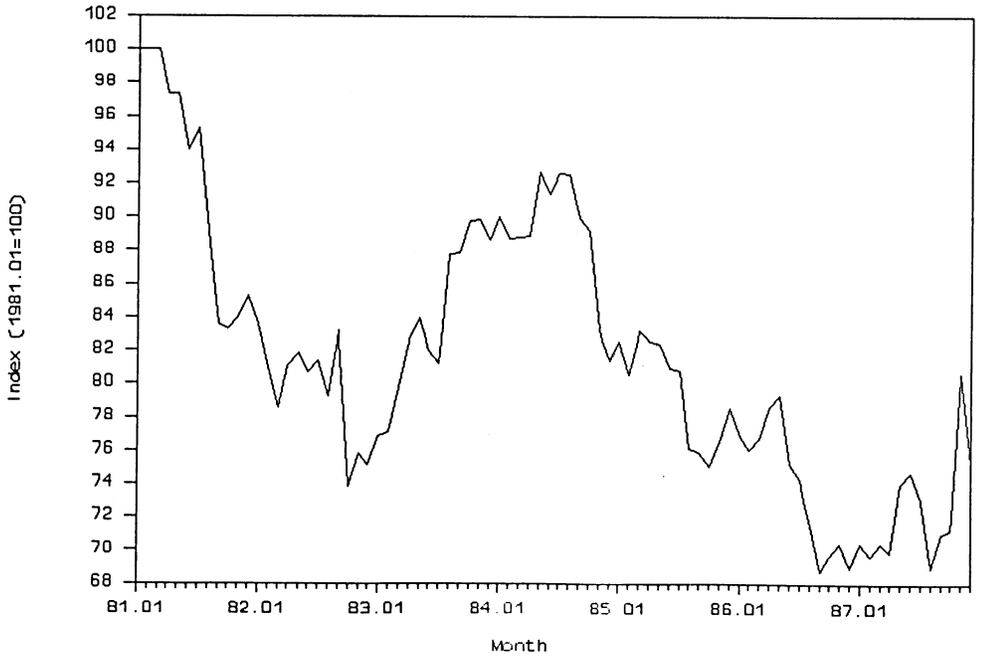
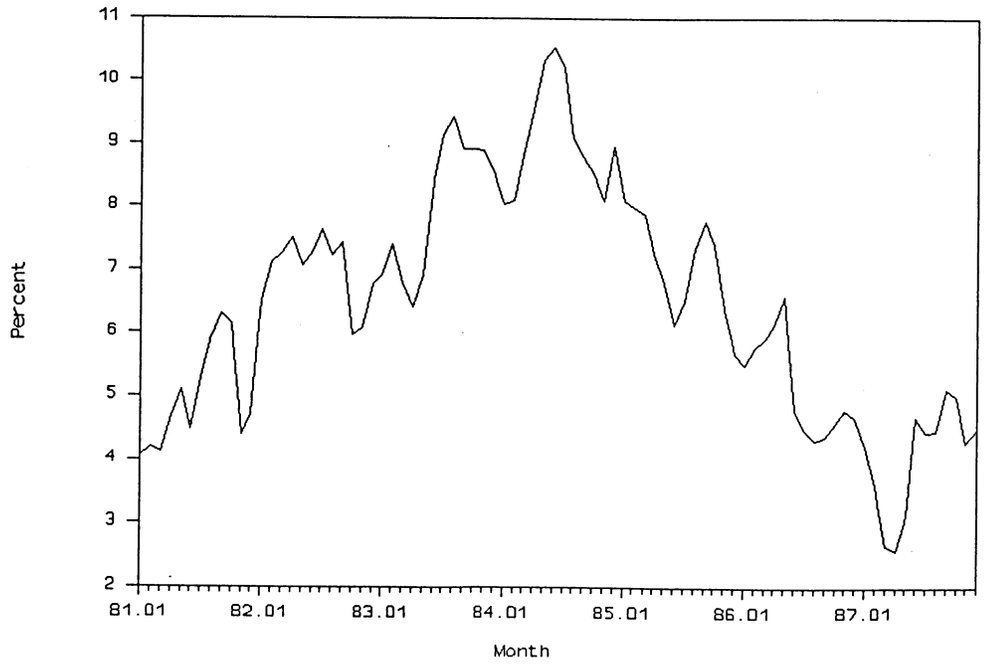


Figure 4--U.S. real interest rate



annual rate of inflation in the U.S. producer price index (PPI). The rate of inflation was calculated as the percentage change in the PPI from 12 months previously to the current month.

From theory and the above discussion, we hypothesize that foreign net acquisitions of U.S. cropland should be negatively related to the value of the dollar and the U.S. real interest rate, and positively related to returns to U.S. cropland.

Table 2 presents results for ordinary least squares regressions based on (1). The coefficient estimates for the real exchange rate are negative in sign as hypothesized, but none are significant. Five of the seven coefficient estimates for the cropland returns variable are positive, and three of the seven (for Canada, Netherlands Antilles, and Switzerland) are significantly greater than zero. Six of the seven coefficients for the U.S. real interest rate are negative, but none are significant. The constant coefficient estimate is negative and significant for the Netherlands Antilles and

Table 2--Ordinary least squares regression results

$$A_i(t) = a_i + b_i \ln X_i(t) + c_i \ln W(t) + d_i R(t) + e_i(t)$$

Country	a	b	c	d	R^2	DW
Canada	-0.018	-0.072	0.084*	-0.309	0.080	2.19
	(.493)	(.094)	(.037)	(.186)		
Mexico	.001	-.016	.025	-.301	.252	2.29
	(.206)	(.009)	(.040)	(.179)		
Netherlands	.149	-.017	-.011	-.199	.041	1.89
	(.237)	(.036)	(.042)	(.302)		
Netherlands Antilles	-.147*	-.015	.051**	-.103	.214	2.05
	(.067)	(.010)	(.012)	(.086)		
Switzerland	-.584**	-.016	.156**	-.372	.258	1.94
	(.144)	(.024)	(.030)	(.196)		
United Kingdom	.011	-.001	.001	-.130	.006	1.94
	(.318)	(.035)	(.047)	(.003)		
West Germany	.141	-.014	-.017	.142	.014	2.05
	(.129)	(.020)	(.023)	(.165)		

Notes: Standard errors in parentheses.
* Significant at the .05 level.
** Significant at the .01 level.
DW is the Durbin Watson statistic.
R^2 is the coefficient of determination.
Sample period is January 1981 through December 1987, except for Mexico (January 1981 through September 1985).

Switzerland. This result indicates that on average there was a decrease in foreign holdings for those countries in each period from factors independent of the exchange rate, the real interest rate, or U.S. cropland returns.

Examination of the data revealed that large outliers existed for several of the countries. For example, in April of 1981, a German disposition of 23,730 acres occurred, a number which in absolute magnitude is over twice as large as any other German acquisition or disposition over the sample. Similar outliers existed in the data for Canada, the Netherlands, the Netherlands Antilles, and the United Kingdom. Table 3 presents results from estimations in which the outliers were omitted from the sample. The results improve somewhat relative to those shown in table 2. The most notable improvements are that the real interest rate coefficient in the Canada regression is significant, the coefficient on the returns variable is of correct sign for the case of the Netherlands, and, for the Netherlands Antilles regression, the exchange rate coefficient is significant. Still, the exchange rate and real interest rate terms do not generally enter significantly in the regressions.

A likely explanation for the lack of significance for the real interest rate and the real exchange rate terms is that a high degree of multicollinearity exists between them in the regression. The asset market approach for exchange rates specifies exactly such a relationship (Dornbusch (1976), Mussa (1982)). Table 4 presents correlation coefficients for the real interest rate and the various countries' real exchange rates. The correlation is quite high between the U.S. real interest rate and the exchange rates of the mainland European currencies. The British pound-U.S. dollar real exchange rate exhibits less of

Table 3--Ordinary least squares regression results (with major outliers omitted from sample)

$$A_i(t) = a_i + b_i \ln X_i(t) + c_i \ln W(t) + d_i R(t) + e_i(t)$$

Country	a	b	c	d	R^2
Canada	0.163	-0.130	0.107**	-0.491**	0.212
	(.385)	(.074)	(.029)	(.148)	
Netherlands	-.078	-.010	.032	-.188	.053
	(.138)	(.021)	(.024)	(.174)	
Netherlands Antilles	-.135*	-.020*	.054**	-.078	.322
	(.055)	(.008)	(.010)	(.070)	
United Kingdom	-.189	-.005	.051*	-.120	.072
	(.165)	(.018)	(.025)	(.153)	
West Germany	-.041	-.022	.035*	-.022	.106
	(.082)	(.012)	(.015)	(.103)	

Notes: Standard errors in parentheses.
* Significant at the .05 level.
** Significant at the .01 level.
R^2 is the coefficient of determination.

Table 4--Correlation coefficients for real interest rate and real exchange rates

Country	Cor(Xi(t),R(t))
Canada	-0.271
Mexico	.466
Netherlands	.759
Switzerland	.739
United Kingdom	.580
West Germany	.766

a relationship with U.S. real interest rates, partly due to the fact that the international value of the pound is affected significantly by the price of crude oil in world markets. A much smaller positive correlation is observed between the U.S. real interest rate and the Mexican peso-U.S. dollar real exchange rate. Finally, a small negative correlation is observed for the Canadian dollar-U.S. dollar exchange rate. The lack of a high correlation between the U.S. real interest rate and the Canadian-U.S. exchange rate can be partly explained by the fact that the real Canadian-U.S. exchange rate did not vary greatly over the sample, as shown in figure 1. Also, the Bank of Canada has conducted monetary policy based on minimizing Canadian-U.S. exchange rate fluctuation.[1] Aside from Canada, these results suggest that a high degree of collinearity would exist between the real interest rate and real exchange rate terms in regressions such as (1), particularly in application to European countries.

The problem with multicollinearity among regressors is that the coefficient estimates become less reliable since the standard errors of the coefficient estimates become larger. Significance tests for the coefficient estimates are therefore adversely affected.

To examine the possible effects of multicollinearity in the regressions, we chose to estimate regressions which alternately included only one of the variables. The results are reported in table 5. The standard errors of the coefficient estimates are substantially lower in table 5 than those shown in table 3, a result consistent with the problem of multicollinearity. The role of the returns variable appears to be fairly robust, as it enters significantly in 11 of the 14 regressions. In the regressions that include the real exchange rate but not the real interest rate, the real exchange rate coefficient is significant for Mexico, the Netherlands Antilles, Switzerland, and West Germany. The U.S. real interest rate enters significantly in every case except the United Kingdom.

In comparing the regression results within table 5 and also those of table 3, it appears that the real exchange rate and the real interest rate carry much the same information for acquisition behavior for the various countries. This is not surprising since both interest rates and exchange rates are key

[1]See Bordo and Choudhri (1982) and Husted and Kitchen (1985) for more information on these Canadian-U.S. monetary policy relationships.

Table 5--Ordinary least squares regression results (with major outliers omitted from sample)

$$A_i(t) = a_i + b_i \ln X_i(t) + c_i \ln W(t) + d_i R(t) + e_i(t)$$

Country	a	b	c	d	R^2
Canada	0.133 (.409)	-0.088 (.078)	0.063* (.027)		0.101
Canada	-.477 (.124)		.115** (.029)	-0.447** (.147)	.181
Mexico	.108 (.199)	-.024** (.008)	.006 (.039)		.212
Mexico	-.260 (.147)		.067* (.032)	-.472** (.155)	.207
Netherlands	.024 (.101)	-.026 (.015)	.024 (.023)		.039
Netherlands	-.120 (.105)		.031 (.024)	-.248* (.123)	.050
Netherlands Antilles	-.094* (.040)	-.027** (.006)	.051** (.009)		.311
Netherlands Antilles	-.220** (.044)		.053** (.010)	-.197** (.051)	.272
Switzerland	-.420** (.117)	-.046* (.019)	.145** (.030)		.225
Switzerland	-.632** (.126)		.151** (.029)	-.459** (.148)	.254
United Kingdom	-.091 (.107)	-.014 (.013)	.038* (.019)		.064
United Kingdom	-.226* (.096)		.054* (.022)	-.149 (.112)	.071
West Germany	-.029 (.058)	-.024** (.009)	.034* (.014)		.106
West Germany	-.133* (.065)		.033* (.015)	-.151* (.075)	.069

Notes: Standard errors in parentheses.
* Significant at the .05 level.
** Significant at the .01 level.
R^2 is the coefficient of determination.

financial variables that react to similar information. Notable exceptions are the cases of Canada and the Netherlands, for which the real interest rate specification outperforms the real exchange rate specification. The lack of a significant relationship for the case of Canada is partly to be expected, due to monetary policy relationships and the small variation within the real exchange rate series as shown and described above.

To further exploit the data set, we chose to simultaneously estimate the regressions for the countries and to test the imposition of various cross-equation restrictions on the coefficients. That is, we wanted to examine whether the exchange rate, interest rate, and returns parameters were similar in magnitude across countries. Data for Mexico were not used because of the shorter sample period.

Table 6 shows the calculated values of the F-statistics for testing the hypotheses of coefficient equality across all of the regressions. All of the F-statistics exceed the critical values for significance at the 0.05 level. Only one of the F-statistics, for testing equality of exchange rate effects, fails to be significant at the .01 level. Hence, we conclude that exchange rates, cropland returns, and interest rates have different magnitudes of effect on acquisition behavior across countries.

Summary and Conclusions

The results presented here support the view that exchange rates, interest rates, and returns on U.S. cropland are important explanatory variables for foreign investment in U.S. cropland. The results indicate that foreign acquisitions are negatively related to the exchange value of the dollar and the U.S. real interest rate, and positively related to U.S. cropland returns.

The interpretation regarding the exchange rate effect is that the foreign currency cost of U.S. agricultural land increases as the exchange value of the dollar rises. Not only does the cost to foreigners of purchasing land increase, but the opportunity cost of holding land also increases as the exchange value of the dollar rises. Hence, the quantity of net acquisitions

Table 6--F-statistics for testing cross-equation coefficient restrictions

$$A_i(t) = a_i + b_i \ln X_i(t) + c_i \ln W(t) + d_i R(t) + k_i dumi(t) + e_i(t)$$

Ho: $b_i = b_j$, all countries i,j	F = 3.94*
Ho: $c_i = c_j$, all countries i,j	F = 20.36**
Ho: $d_i = d_j$, all countries i,j	F = 7.54**
Ho: $(b_i, c_i, d_i) = (b_j, c_j, d_j)$, all countries i,j	F = 9.41**

Critical values are: $F(.05,1,468) \approx 3.84$
$F(.05,3,468) \approx 2.60$
$F(.01,1,468) \approx 6.63$
$F(.01,3,468) \approx 3.78$

of agricultural land by foreign owners declines as the foreign exchange value of the dollar rises.

The opportunity cost view also helps to explain the importance of the U.S. real interest rate as a determinant of foreign net acquisitions of U.S. cropland. As the real interest rate rises in the United States, returns on liquid assets rise relative to returns on hard assets such as land. Foreign investors who desire to keep their investments in U.S. dollar denominated assets may choose to sell the less liquid asset with the lower return, and hold the funds in more liquid, higher return money market assets. However, the estimates do not suggest a high degree of substitutability. For example, the estimates in table 5 indicate that a 100-basis-point increase in the real interest rate would lead to a decline in foreign landholdings of less than one-half of 1 percent.

Also in conformance with standard theory and the preponderance of corporations among foreign owners, the results indicate that foreign investment is positively related to returns on agricultural land. This result can only be viewed as suggestive of the actual effect because of the use of the ratio of prices received on crops to prices paid as a proxy for the returns to cropland.

The foreign investment series are inherently noisy. In the best cases, exchange rates, interest rates, and cropland returns explain only about 20-30 percent of the variation in foreign investment. A large portion of foreign investment activity in agricultural land, thus, remains unexplained by the variables used here. A likely source for the inelastic response of foreign land investment to exchange rates and interest rates and for the low explanatory power of the regressions is the high level of transactions costs involved in buying and selling land. The incentive to change landholdings in response to variation in exchange rates and returns on alternative financial assets is greatly reduced as a result of the high transactions costs in the land market.

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