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A FORECAST MODEL OF FOREIGN DIRECT INVESTMENT IN THE  
UNITED STATES

Patrick Manchester

Title in capital letters.

Use 14 point Times Roman above this point and 12 point Times Roman below this point.

Submitted to the Economics Faculty  
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April 2006

# Faculty Advisor Signature Page

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Associate Professor of Economics

Date

Unless otherwise indicated, use 12 point Times Roman font for the text. Footnotes should be in 10 point Times Roman. Margins should be 1" on the top and bottom, and 1.25" on the left and right. Double-space the text. Skip an extra line between sections. Bold section titles.

Typical section titles are:

- Abstract
1. Introduction
  2. Model
  3. Results
  4. Conclusion
  5. References.

## Typical grammatical errors to avoid

### Disagreement among subject, verb, and pronouns

Incorrect: *The candidate will expend effort on their campaign.*

Correct (singular): *The candidate will expend effort on his campaign.*

Correct (plural): *The candidates will expend effort on their campaigns.*

### Passive voice

Incorrect: *The objective function was maximized with respect to campaign effort.*

Correct: *I maximized the objective function with respect to campaign effort.*

### Unnecessary future tense

Incorrect: *This model will demonstrate the impact of campaign finance reform.*

Correct: *This model demonstrates the impact of campaign finance reform.*

Number pages at the lower right starting with page 2. Do not put a page number on the cover page.

# A FORECAST MODEL OF FOREIGN DIRECT INVESTMENT IN THE UNITED STATES

Patrick Manchester, BSBA

Duquesne University, 2006

Title in capital letters.

*With the rise of the East Asian economies and the continuing prominence of the European Monetary Union, one of the principal concerns of future American economic growth is the degree to which foreign investment will continue to support the United States economy. In this paper, I develop a forecast model that predicts the expected future value of foreign direct investment in the United States. I use the results of this analysis to analyze the factors that affect foreign direct investment, as well as to assess future trends in foreign investment in the United States. Moreover, I use the results to analyze the implications of foreign direct investment in the United States on government fiscal and monetary policy.*

*The results suggest that foreign direct investment will increase over the four quarters of the year 2005 with a slight decrease during the fourth quarter, and that, as a result of the fact that foreign direct investment tends to increase in light of slow economic growth, high interest rates, high inflation, a depreciating dollar and a balance of trade deficit, there will be a disincentive for the government to encourage its growth. The results also suggest that foreign direct investment actually plays a part in the self-correction of business cycles.*

Single space the text on this page.

Key words: foreign, direct, investment, currency, forecast, monetary policy, interest, inflation

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### WARNING

This sample is intended to specify the format of the Senior Thesis, not the content. This paper is a semester paper and is not at the level of rigor of a thesis.

# 1. Introduction

The abstract does not get a section number. The introduction is section 1.

Hendriks (1990) asserts that economic expansion in the United States during the late 1980's was due primarily to foreign investment activity. He states that "although foreign investment plays a major role in fueling the U.S. economy, American citizens tend to meet foreign investment with resentment."<sup>1</sup> Interestingly, Hendriks notes that there is no correlation between this ill will and the size of the investment. He mentions, for instance, Japan as a major target of this enmity regardless of the fact that at the time of the analysis, Western Europe had by far the largest amount of money invested in the United States. Hendriks also attributes the large proportion of investment in the U.S. to rapid economic growth and reductions in tax rates, which allow businesses to enhance their returns on capital investment. He also cites deregulation of capital controls, institutionalization of savings, diversifying of foreign portfolios, shrinkage of U.S. banks' foreign operations along with a rise in non-U.S. banking activities in the U.S., and the trade deficit as major determinants of foreign capital inflows into the United States.

In another study, Grosse and Trevino (1996) focus on the primary determinants of inflows of foreign direct investment into the United States. Using ordinary least squares regression analysis, Grosse and Trevino study the primary determinants of foreign direct investment inflows. The model includes a dependent variable measured as the book value of foreign direct investment in the U.S. on a country-by-country basis, along with the value of sales of U.S. affiliates of foreign investors. In this way, the model takes into account both new investments by foreigners as well as reinvestment of retained earnings by U.S.-based foreign subsidiaries. Moreover, Grosse and Trevino find that several dependent variables have significant explanatory power on the foreign direct investment

<sup>1</sup> Hendricks (1990), p. 31.

Start the introduction on a new page.

The purpose of the introduction is to describe other researchers' findings that are relevant to your work. At the end of the introduction, describe (in one or two sentences) how your work is an extension of the works you described in the introduction.

Apart from the last one/two sentences, you should not mention your work in the introduction.

Enclose (short) direct quotes in quotation marks and footnote the page number from which the quote is taken.

Reference authors by name and year of publication (in parentheses).

If a single author has more than one publication in a given year, identify the different publications as: Smith (1990a), etc.

If you mention an author more than once in a single paragraph, only list the date of publication with the first reference to the author.

variables. In particular, they find that existing bilateral trade, the size of the home country market, per capita income, political risk in the home country, geographic distance from the United States, cultural distance from the United States, the relative cost of borrowing, the relative rate of return, and the exchange rate best explained foreign investment inflows. Of these variables, Grosse and Trevino find bilateral trade, home country GDP, and the exchange rate to be the most significant, while they find that per capita income and political risk had the correct signs, but were insignificant. Grosse and Trevino note that their model

*...exhibits no bias when accounting for differences of flows between richer and poorer countries. The more relevant findings of the analysis are, ceteris paribus, decreased foreign direct investment from countries with a greater propensity to import U.S. goods, and a positive relationship between the degree of political risk in a country and the total amount of direct investment in the United States by that country.*<sup>2</sup>

Using another approach, Amuedo-Dorantes and Pozo (2001) focus on the extent to which particular factors influence foreign investment inflows by measuring the degree to which the exchange rate level, as well as the volatility in exchange rates, affects foreign direct investment inflows. In direct contrast to prior research efforts, the authors find that there is no statistically significant short-run link between the exchange rate and foreign direct investment flows into the United States. However, they conclude that exchange rates, as well as exchange rate volatility do have a long-run impact on foreign direct investment in the United States expressed as a percentage of GNP. Moreover, the findings of the research conclude that real exchange rate uncertainty does not have a

When quoting a longer passage, indent and italicize the passage.

Include a footnote referencing the page on which the passage is found.

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<sup>2</sup> Grosse and Trevino (1996), p. 157.

discernable effect on foreign investment flows into the United States when exchange rate uncertainty is evaluated using a naïve measure. In this case the naïve measure consisted of a rolling standard deviation of the movement of exchange rates. However, the findings indicate that foreign direct investment into the United States tends to decrease in response to volatility of the exchange rate when a more sophisticated conditional measure is employed. These findings are particularly relevant in that, contrary to prior research regarding the relationship between exchange rates and their volatility and inward foreign direct investment, they take into account a conditional measure of exchange rate volatility and consider stationarity of the series as well as cointegration.

← Skip a line between sections.

## 2. Model

In estimating a model to forecast future foreign direct investment in the United States, I build on the previously cited literature. Following Hendriks (1990), I include a comparison of U.S. economic growth to foreign economic growth and the size of the U.S. trade balance. The first of these variables measures growth in U.S. versus foreign real GDP. I use this variable to calculate the difference between U.S. and British economic expansion. I use the difference between the two variables in order to take advantage of their co-integrating relationship and eliminate the non-stationarity in the two variables. Moreover, I include the growth rate of the U.S. trade balance in the model. I use a growth rate in calculating this variable in order to eliminate non-stationarity in the data.

In this section, describe the model you have constructed. Do not discuss intermediate models unless the purpose of your paper is to show novel uses of intermediate work.

Following Grosse and Trevino (1996), I include comparative economic growth, lending terms, and exchange rates. The first of these variables assesses changes in the gap between U.S. and foreign lending rates. I use a second difference between the two

lending rates in order to make the variables stationary. In particular, I use this variable to assess the difference between Canadian and U.S. lending rates. I also use the second difference of an index of the United States dollar based on a basket of major currencies, once again using a second difference in order to eliminate the effects of non-stationarity in the data.

Finally, I also include a measure of comparative inflation rates in order to determine the effect of price level changes on the magnitude of foreign direct investment. For instance, one of the variables I use in the model measures the ratio of U.S. inflation to Japanese inflation, each measured according to the PPI of their respective countries. I use the ratio between the two variables in order to exploit their co-integrating relationship and eliminate the non-stationarity in the two variables. When the ratio is greater than one, U.S. inflation outpaces Japanese inflation.

I estimate the following model:

Number and center each equation.

$$Y_t = \alpha + \beta_1 (GDP_{US,t} - GDP_{UK,t}) + \beta_2 \left( \frac{PPI_{US,t}}{PPI_{J,t}} \right) + \beta_3 C_{t-9} + \beta_4 X_{t-6} + \beta_5 T_{t-9} + \varepsilon_t \quad (1)$$

Clearly state the equation you are estimating.

Include a table that clearly defines the variables you are using in the model.

Do not split tables across pages.

$Y_t$	Growth rate in foreign direct investment in the United States from period $t-1$ to period $t$
$GDP_{US,t}$	Growth rate in U.S. real GDP from period $t-1$ to period $t$
$GDP_{UK,t}$	Growth rate in U.K. real GDP from period $t-1$ to period $t$
$PPI_{US,t}$	U.S. inflation rate based on the PPI from period $t-1$ to period $t$
$PPI_{J,t}$	Japanese inflation rate based on the PPI from period $t-1$ to period $t$
$C_t$	$RUS_t - RCA_t - (RUS_{t-1} - RCA_{t-1}) - (RUS_{t-1} - RCA_{t-1}) - (RUS_{t-2} - RCA_{t-2})$ where $RUS$ is the U.S. lending rate and $RCA$ is the Canadian lending rate
$X_t$	Second difference of indexed United States dollar exchange rate
$T_t$	Growth in the United States trade balance from period $t-1$ to $t$

As a proxy for foreign direct investment in the U.S., I calculate  $Y$  as the sum of foreign capital flows into the United States and income earned by foreigners in the United States.

Italicize all variables. Use Greek letters to represent parameters and Roman letters to represent variables.

### 3. Results

The results of the least-squares regression model estimated using equation (1) appear in Table 1.

Show the results of your model estimation as well as the resulting forecasts. Point out where your results match what theory suggests. Where your results do not match what theory suggests, provide a cogent explanation and/or references to other researchers who found similarly non-intuitive results.

**Table 1. Estimated Forecast Model**

$$Y_t = \alpha + \beta_1 (GDP_{US} - GDP_{UK})_{t-8} + \beta_2 \left( \frac{PPI_{US}}{PPI_J} \right)_{t-5} + \beta_3 C_{t-9} + \beta_4 X_{t-6} + \beta_5 T_{t-9} + \varepsilon_t$$

Coefficient	Estimate	Standard Error	P-value
$\alpha$	0.231	0.140	0.109
$\beta_1$	-3.416	1.202	0.008
$\beta_2$	0.022	0.006	0.002
$\beta_3$	-0.434	0.301	0.160
$\beta_4$	-0.063	0.028	0.031
$\beta_5$	2.100	0.874	0.023
R- squared	0.538	F-statistic	6.292
Adjusted R-squared	0.453	P-value (F-statistic)	0.001
S.E. of Regression	0.657	Durbin-Watson stat.	1.781

OLS with White Heteroskedasticity-Consistent Standard Errors & Covariance

The estimate for  $\beta_1$  indicates that a 1% decline in the difference between the GDP growth rates for the U.S. and the U.K. is associated with a 3.4% increase in the growth of foreign direct investment in the U.S. Although this seems counter-intuitive, it could be due to recent political and economic changes associated with the continued growth of the European Internal Market. For example, Pain (1996) finds that, “the Internal Market program has had a significant, positive impact on the aggregate level of intra-EU investment by U.K. corporations, enhancing the process of ‘continental drift’, with some weak evidence of investment diversion from the U.S. since 1990.” This suggests that the

Round off your figures to three or four significant digits.

Do not cut/paste results from software output.

decrease in foreign direct investment in the U.S. associated with a comparatively expanding U.S. economy could be due to the fact that British investors find it increasingly easier to invest in the European Union, especially given its continued relaxation of trade barriers and geographic proximity.

The estimate for  $\beta_2$  suggests that an increase in producer inflation in the US relative to Japan is associated with an increase in foreign direct investment in the US. This is consistent with an increase in relative advantage for Japanese manufacturers versus American manufacturers.

Third, I find that, on average, the value of  $\beta_3$  indicates that a decline in the difference between U.S. and Canadian lending rates of 100 basis points corresponds with a 0.43% increase in inward foreign direct investment. Although this seems counter-intuitive in that we would normally expect investment in the United States to decline when lending rates become less competitive, this phenomenon may be due to the proximity between Canada and the U.S. Perhaps Canadian investors are relatively indifferent to differences in lending rates because it is easy for them to obtain loans from either country, especially in light of decreasing trade barriers brought on by NAFTA and other free trade agreements.

I also find that, according to the value of  $\beta_4$ , a decrease in the second difference of the dollar exchange rate index of 1.0 corresponds with a 0.06% increase in the growth rate of inward foreign direct investment. From this, I conclude that as the dollar decreases in value, it becomes more cost-effective for foreign investors to establish operations in the United States as a result of the fact that these investors can obtain more U.S. dollars with their local currencies, and thus effectively decrease the start-up costs of their

operations. Interestingly, these results directly contrast the findings of Amuedo-Dorantes and Pozo (2001) that there is no statistically significant short-run link between the exchange rate and foreign direct investment flows into the United States. Finally, I find that the value of ( $\beta_5$ ) indicates that as the trade balance grows by 1%, inward foreign direct investment grows by 2.10%. From this I conclude that foreign investors who wish to establish operations in the United States see an increase in the trade balance as a “green light” because it is usually indicative of increased American purchases of foreign products.

Following estimation of the model, I use equation (1) to generate forecasts for the level of foreign direct investment in the United States over the four quarters of 2005. I forecast for the year 2005 due to the fact that most of the data I use to calculate these forecasts were not available for the year 2005. These forecasts, along with their respective 75% and 90% confidence interval estimates, appear in Table 2.

**Table 2. Forecasts and Confidence Intervals for Foreign Direct Investment**

Date	Forecast	75% Lower	75% Upper	90% Lower	90% Upper
2005-I	38,270	-2,550	79,080	-20,180	96,710
2005-II	69,380	37,930	100,830	24,340	114,410
2005-III	84,880	28,910	140,860	4,730	165,040
2005-IV	80,250	10,620	149,880	-19,460	179,950

In general, these results suggest that, given the information provided in equation (1), inward foreign direct investment will gradually increase over the year 2005, with a slight decrease in the last quarter of 2005.

#### 4. Conclusion

The purpose of this analysis was to develop a model to forecast future foreign direct investment in the United States. Ultimately, the results of the analysis have

Use Arial 10 point font for tables.

Do not copy/paste output from statistical packages.

Round off forecasts to three or four significant digits.

manifold ramifications. First, the analysis indicates that from a policy perspective there is actually a disincentive for the United States government to implement policies that are likely to spur inward foreign direct investment because, according to the findings above, inward foreign direct investment tends to increase during periods that exhibit one or more of the following characteristics: slow economic growth, high interest rates, high inflation, a depreciating dollar, and a growing balance of trade deficit. Ironically, as these are all relatively undesirable economic conditions, it is unlikely that the U.S. government would take steps that would encourage inward foreign direct investment. Moreover, it seems to suggest that, at least among the largest investors in the U.S., there is a general sentiment that investment opportunities are more lucrative during periods when the U.S. economy is relatively weak in comparison to foreign economies. While this seems counter-intuitive, it could be due to the fact that foreign investors see negative economic trends as an opportunity for cost-effective start-up costs. Moreover, it is likely that revenues for these investors will increase as the U.S. economy stabilizes over the long run. This, in turn, suggests that foreign direct investment helps to support the American economy during expansions and contractions in the business cycle, and plays a part in the self-adjustment mechanism that restores conditions to potential GDP.

Briefly (in one or two sentences) repeat the purpose of your paper. Summarize your results and show the implications of your results. Where appropriate, provide suggestions for future research (the purpose of this is to encourage other researchers to follow the path you have set out in the paper).

Further research along the lines of this analysis should focus on a more wide-scale method of predicting future trends in inward foreign direct investment. Limited time and resources restricted the number of regressors used in this analysis to the largest investors in the United States. While according to the adjusted coefficient of determination yielded by the least squares regression modeled in equation (1) ( $\bar{R}^2 = 0.45$ ) these variables held considerable explanatory power, future research should

take into consideration the effects of middle or small-sized economies on inward foreign direct investment in order to develop a clearer picture of trends in these investments. Moreover, limited resources also restricted the sample range of the model developed in this analysis to quarterly data spanning the years 1994 to 2004. Future research should take into account a broader timeframe to incorporate longer term economic trends and their effects on inward foreign direct investment.

Start the references section on a new page.

## 5. References

Amuedo-Dorantes, C. & Pozo, S., 2001. Foreign Exchange Rates and Foreign Direct Investment in the United States. *The International Trade Journal*, vol. 15, 323-343.

Grosse, R. & Trevino, L.J., 1996. Foreign Direct Investment in the United States: an Analysis by Country of Origin. *Journal of International Business Studies*, vol. 27, no. 1, 139.

Hendriks, M., 1990. International Factors Affecting the U.S. Business Cycle. *Business Economics*, vol. 25, no. 3, 29.

Pain, N., 1996. Continental Drift: European Integration and the Location of UK Foreign Direct Investment. *The Manchester School of Economic & Social Studies*, Blackwell Publishing, vol. 65, 94-117.

### Rules for references

List every paper mentioned in your article and every paper footnoted in the references section.

Do not list any paper in the references section that you have not either mentioned in your article or footnoted.

### Other errors to avoid

Know the meaning of every word you use. Synonyms are never perfect; each has its own nuance. Using “intelligent-sounding” words without regard to their specific definitions degrades your work and encourages the reader to assume that you are trying (poorly) to hide a lack of effort amongst a smoke-screen of syllables.

Don't state the obvious. Assume that the reader understands the basics of economics and is at least as mathematically proficient as you. For example, there is no need to state that “OLS estimators are unbiased,” etc.

Do not refer to yourself in the third person. It sounds pompous.

Do not use slang. It is unprofessional.

Do not use flowery prose. It causes the reader to wonder what you're hiding.

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