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For Writing Seminar
Final Project
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A Guide to Writing Regression Analysis

As an Econ major, I have found that frequently the hardest part of 300-level papers is not the regression analysis itself, but how to write about it. The purpose of this guide is to help students and tutors alike to better understand how to *write* about work in economics.

Regression analysis writing requires a careful balance between adequate explanation and concise expression. Economics writing, in general, tends to be sparser than that of many other disciplines. However, failing to fully explain your methodology, results, or interpretation, can prove a fatal flaw. Additionally, there are certain pieces of information that nearly all economics papers include and several conventions of language that are common to economics writing. This guide is designed to address each of these issues.

Structure & Content

A typical empirical economics paper contains six sections, although variation on this pattern certainly exists. Below is an outline of a typical paper, including a description of what each section might comprise.

Introduction

- Introduce the topic of your study; provide background information as well as context (how much depends on the length of your paper).
- Provide the motivation for your study (why it is important, etc).
- Articulate the aim of your study; what *specifically* does your paper address?
- Preview your results; you might want to explicitly point out your most important result.

Literature Review

- Summarize the existing literature on your topic.
    - Your use of direct quotations should be minimal.
- Present any economic theory that is relevant to your topic (Remember you MUST provide citations for such information.)
- Include a brief paragraph that puts your work in the context of the literature you discuss.

Model/Methodology

- Present your research question again; note what sort of results would support your hypothesis and what sort might contradict your hypothesis.
- Present your econometric model; show the equation in its full form.
    - Remember that a "perfect model" is not a realistic assumption for an undergraduate empirical economics paper; to assume such will limit your research ability.
- Describe each variable; include the units in which it is measured.

    - If any of your variables are unorthodox in construction (as in the example on pages 12 and 13, which uses 7 dummy variables) explain how the results will be interpreted.
- Acknowledge or address issues with your methodology; such issues might include collinearity or endogeneity.
    - For an Econ 300 paper, you may not have the skills to address such issues, but acknowledging them will show a nuanced understanding of your research.

Data

- *Note: this section can be included in the *Model/Methodology* section of your paper.
- Present and describe your data set.
    - Description could include: number of observations, sources, reliability, missing data.
    - Address any issues you might have with your data.
- Include descriptive statistics of your data: average, standard deviation, mean, etc.
- If you use any criteria to determine your dataset, describe such criteria.
    - For example: you use macroeconomic data and you excluded countries with very low populations.

Results and Interpretation

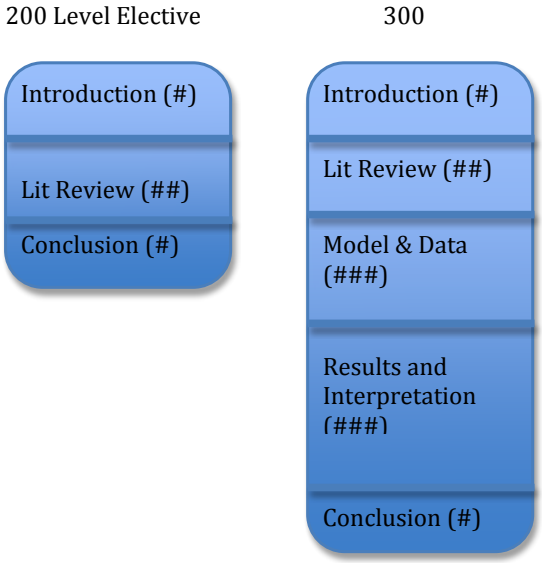
- Present the results of your regression analysis.
    - Be careful not to focus only on statistical significance, the magnitude of your coefficient as well as the economic significance of the result is also important.
- Interpret your results and their implications; relate them to the hypotheses you discussed in the *Model/Methodology* section.
    - Specifically, do your results support or undermine your hypothesis?
- Place your findings in the context of the literature on the topic.
    - For example, are your findings consistent with previous literature? Or do they represent a major departure?

Conclusion

- Summarize your findings and their implications.
- Put your findings in the context of a "big picture."
    - Whether your finding support or undermine your hypothesis, tell the reader why your findings are important and what they contribute to the literature.
- Although not necessary, you might include some suggestions for further research or ways in which your work could be improved upon.

Page Allocation

Another issue is how to allocate paper space to each of these sections. The diagram below addresses allocation across the various levels of economics courses.



The "#" symbols represent the approximate proportion of pages you might dedicate to that section relative to other sections. Please note that every professor has slightly different expectations and this should be taken only as a loose guideline. For a 300 paper, the additional pages come not from a longer literature review or a more extensive introduction, but from the description of your model and interpretation of your results.

Writing Conventions

Like many other disciplines, Economics has its own set of writing conventions. Below are listed some conventions of which you should be aware when writing your paper.

- In describing your work, you can use the first or third person. Check you're your professor as to his or her preference. Whichever option you choose, be sure to be consistent.
  - For example, "**I** use an OLS regression equation…" or **"**I find the coefficient on X_1 to be positive and…"
  - Or, "**This paper** uses an OLS regression equation" or "**This paper** finds the coefficient on X_1 to be positive and…"
- When writing about an empirical work, whether it's that of another author or your own work, use the present tense.
  - For example, "This paper **uses** an OLS regression equation" or "This paper **finds** the coefficient on X_1 to be positive and…"

- Economics writing does sometimes use passive voice construction, and it is sometimes the best way to express your methodology and results. This exception is particularly true when the focus of the sentence would be the object of a sentence with active construction. In the example below, the focus of the sentence is *GDP growth and exchange rate adjustment,* not the doer of the action. However, you should minimize your use of this construction.
    - For example, "In this section, GDP growth and exchange rate adjustment **are regressed** on…" *passive* vs. "I regressed GDP growth and exchange rate adjustment on…" *active.*
- Regarding how to write numbers, a convention is to express numbers 10 and higher in numerical form and to write out numbers less than 10. Whichever you choose, be sure to be consistent.
- Economics writing is generally much more sparse than that of other disciplines. Although some disciplines value extensive and descriptive adjectival phrases, economics favors concise and accurate description. Additionally, while other disciplines might encourage variation in description, such variation can cause confusion regarding the interpretation of your variables. Use consistent language when describing your results and their interpretation.
    - For example, do not use the synonym function on Microsoft Word to find other ways to say "positive" and "negative."
- Economics papers typically use parenthetical citations that have the format of (Author Year, page). When you reference the work of other authors, you should do so using the format of Author(s) (Year). Note that if an article has multiple authors, the names of all authors must be shown in both citation forms.
    - For example, "She also finds that reversals usually involve a deceleration of income growth and a significant depreciation of real exchange rate (Freund 2005, 1293)."
    - For example, "Fruend (2005) provides an analysis of…"
    - For example, "Croke, Kamin, and Leduc (2005) evaluate…"
- The reference list should be done in a consistent form. Economics papers generally use Chicago style, however each professor has his or her own preference. If that preference is not articulated in the syllabus, be sure to ask. Whatever style you choose, the reference should begin with the author's name (last, first), followed by the publication year.
    - For example, your citation should begin with "Freund, Caroline. 2005."

Further Research on Economics Writing

Deirdre McClowsky's *Economical Writing,* Second Edition

Links on the American Economics Association Webpage on Writing in Economics
http://www.aeaweb.org/students/Skills.php

Thank you to professors Hornstein, Imai, Jacobsen, and Tien for their advice and input regarding this project.

Example Analysis

The rest of the guide is comprised of an example of regression analysis writing. The following is drawn from a thesis that received the distinction of Honors from the Economics Department. Sections I, II, III, and IV are shown here. Section V, a second analysis, is omitted.

I. Introduction

Over the past several years, the United States has run a large current account deficit. The deficit measured over $473 billion in 2011 (3.1 percent of GDP) and has persistently exceeded 2 percent of GDP since 1998 (The Economist 2012; World Bank World Development Index 2012). This deficit situation has caused alarm among economists and policy makers alike as to how a substantial decrease in this deficit might affect the US economy. As a result of this concern, a large amount of empirical work has been done regarding the characterization of current account deficit reversals[1] in an effort to determine what effect a US deficit reversal might have on the economy.

Comment: Use footnotes to include necessary information that might seem burdensome in the actual text.

However, the current account deficit is only one side of the story. The deficit of one country, by definition, must be financed by the surplus of another (or several others). Therefore, the decline of any current account deficit necessitates a reciprocal decline of one or more current account surpluses. In then Governor Ben Bernanke's March 2005 speech, the current chairman of the Federal Reserve argued that the current US deficit is driven, in part, by developing nations' use of strategies that included switching from positions as net importers of capital to net exporters on international capital markets. He terms the result of this change a global "savings glut," which he believes to be responsible for the rising US current account deficit (Bernanke 2005). Based on Bernanke's argument, any reversal of the US deficit would require a symmetrical reversal of the foreign current account surplus(es) that have financed that deficit.

Although the ballooning US deficit has a spurred significant amount of empirical work regarding the nature of current account deficit reversals, to date, little work has been done on current account *surplus* reversals. In fact, only two articles on the subject have been published: Edwards (2007) and IMF (2010). However, the work that has been done has found support for the relationship between deficit and surplus reversals discussed above. In his paper on current account surpluses and global imbalances, Sebastian Edwards (2007) argues that any resolution of global imbalance (including the US deficit) will require a reduction in China's current account surplus (Edwards 2007, 25).

In 2011, China's current account surplus exceeded $201 billion (2.1 percent of GDP) and has persistently exceeded 2 percent of GDP since 2002. Germany's current account surplus has exceeded 2 percent of GDP since 2004, and in 2011 it measured nearly $203 billion (4.9 percent of GDP), narrowly edging China out as the largest surplus in the world (The Economist 2012; World Bank World Development Index 2012). Both of these sizeable surpluses will likely need to decline for any substantial decrease in the US current account deficit to occur. For this reason, a study addressing whether a typical case exists for surplus reversals is necessary.

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[1] A deficit reversal is defined as a substantial decline in a nation's current account deficit.

The purpose of this paper is to address the void in the literature regarding current account surplus reversals and to gain an understanding of the implications of such events. In order to do so, a basic characterization of surplus reversal episodes is necessary. First, this paper evaluates the dynamics of the outcomes associated with current account surplus reversals, specifically income growth and real effective exchange rate adjustment. Second, it addresses conditions of surplus buildup as a possible explanation for the variation in outcomes.

Comment: Be clear about what you are doing and what you hope to achieve. It may seem simplistic as an author, but it really helps the reader understand what you are doing.

In brief, this paper finds that for developed countries[2], the second year before a surplus reversal is associated with an increase in GDP growth, implying a deceleration of growth following the reversal. For petroleum-based economies,[3] this paper finds that the first year of reversal from surplus is associated with a substantial increase in GDP growth that is likely driven by growth in the non-oil sector. For developing and non-petroleum-based economies, on the other hand, surpluses appear to be associated with slower income growth in the third year before a reversal and a considerable acceleration of real exchange rate appreciation that occurs in the second year before a reversal.

Comment: Economics papers are not mystery novels. You do not need to keep your results hidden until the last page. Preview your important results in the introduction!

Regarding the question of whether certain conditions of surplus buildup can serve as an explanation for variation in outcomes, this paper finds that for surpluses exceeding 6 percent of GDP, the growth of consumption and of government expenditure relative to GDP growth in the pre-reversal period are both associated with a small decrease in GDP growth in the three years beginning with the reversal relative to long-term average growth. This result implies that for larger surpluses, higher growth of consumption and government expenditure as shares of GDP are both associated with slightly lower GDP growth in the reversal period. Concerning real effective exchange rate adjustment, this paper finds that the size of the surplus preceding a reversal is associated with a slightly faster rate of REER depreciation. However, all three of these relationships are limited to episodes associated with a current account surplus that exceeds 6 percent of GDP.

The most important implication of these results is that they support the suggestion that in contrast to the case of current account deficit reversals, there is no distinct and archetypal case associated with current account surplus reversals.

Comment: Point out your most important finding or implication and identify it as such.

The rest of this paper is organized as follows: Section II relates relevant empirical literature on the adjustment of both current account deficits and surpluses. Section III presents basic overview of methodology. In Section IV, the GDP growth and REER adjustment dynamics of current account surplus reversals are analyzed. In particular, this section addresses the question of whether surplus reversals are associated with any speed up or slow down of GDP growth or REER adjustment. Section V presents analysis on the relationship between conditions of surplus buildup and outcomes of surplus reversal. Specifically, it asks whether certain preconditions are associated with more or less severe outcomes of GDP growth and REER adjustment. Finally, Section VI contains some concluding remarks and discusses directions for future research.

Comment: Depending on the length of your paper you may or may not need this section. A general rule might be that for 10 pages or more such an outline is helpful.

II. Literature Review

[2] Defined as OECD-member states.
[3] Defined as OPEC-member states.

Beginning with Sachs's (1981) Brookings paper on oil prices and investment demand as determinants of the dissimilarity in current account balances that existed between countries in the 1970s, there has been a substantial interest in current account adjustment and its determinants. Empirical work by Debelle and Faruqee (1996) and Chinn and Prasad (2000) looks at determinants of current account variation within developing nations and discovers some support for stage-of-development as a determination. However, it was not until the late 1990s and early 2000s that current account deficit reversals, in particular, became a topic of interest. Although this paper discusses current account *surplus* reversals, there are several pieces of empirical work on deficit reversals that are particularly relevant, as they have informed the analysis done here.

Comment: When referencing other works, use the format of Author (Year).

Milesi-Ferretti and Razin (1998) evaluate indicators and consequences of both current account deficit reversals and currency crises in 105 low- and middle-income countries for the period 1970-1996. They ask four primary questions: *what triggers large and persistent reductions in current account deficits?; what triggers sharp exchange rate depreciations (currency crises)?; what are the consequences of these events for output?; and is there a link between current account reversals and currency crises?* (Milesi-Ferretti and Razin 1998, 4).

Milesi- Ferretti and Razin (1998) find that current account deficit reversals are more likely to occur in countries with larger deficits, in countries that have lower reserves, in countries with a higher GDP per capita, and in countries that have more unfavorable terms of trade. They find that reversals are less likely to occur in countries that are recipients of high official transfers and in those whose debt is mostly on concessional terms (Milesi-Ferretti and Razin 1998, 15 and 16).

Comment: For citations, use in –text parenthetical citations, following the format (Author Year, page).

Regarding the consequences of current account deficit reversals, they find that countries with more open economies as well as those with a less appreciated real exchange rate prior to the reversal tend to have better growth performance. Furthermore, Milesi-Ferretti and Razin's (1998) results suggest that for developing countries, current account deficit reversals are not "systematically associated" with a slowdown in income growth (Milesi-Ferretti and Razin 1998, 19 and 30).

As for currency crises, Milesi-Ferretti and Razin (1998) find that lower reserves, a more appreciated real exchange rate, and hostile external conditions—high US interest rates and low growth in industrial countries—make such crises more likely to occur and that in the year of a crisis, growth tends to decline (Milesi-Ferretti and Razin 1998, 24 and 30). Additionally, their results suggest that deficit reversals and currency crises are two entirely "distinct events" (Milesi-Ferretti and Razin 1998, 27 and 30).

Although these results establish a useful set of facts regarding current account deficit reversals in developing countries, Milesi-Ferretti and Razin (1998) do not address current account adjustment in high-income countries. For this, Freund (2005) provides an analysis of the dynamics of current account adjustment among industrial countries. Freund (2005) finds that the average trough, or point at which the reversals process typically begins, is about 5 percent of GDP and that deficits typically resolve in three to four years (Freund 2005, 1284). She also finds that reversals usually involve a deceleration of income growth and a significant depreciation of real exchange rate (Freund 2005, 1293). Freund does not discover any decent predictors—or triggers—of current account deficit reversals, although she does find some evidence to suggest that weak GDP growth tends to "precede a reversal" (Freund 2005, 1297). Finally, with regard to the relationship between

Comment: Try to put the various works of literature that you are citing in context of one another.

current account deficits and the business cycle, Freund finds that deficits tend to increase during periods of above-average growth and to decrease when recession occurs. These results suggest that current account deficit reversals are "largely a symptom of the business cycle" (Freund 2005, 1297).

Milesi-Ferretti and Razin (1998) find no systematic decline in income growth associated with current account surplus reversals in low- and middle- income countries and Freund (2005) finds a slowdown in income growth associated with such reversals in high-income countries, but neither addresses the driving force behind this difference. Freund and Warnock (2005) evaluate the degree to which particular aspects of the increase of the current account deficit are related to more or less severe outcomes following reversal. In particular, these aspects include "the size and persistence of the current account deficit, its nature (whether it is funding consumption or something more productive such as investment), the size and composition of financing, and the openness of the economy" (Freund and Warnock 2005, 2). Freund and Warnock characterize outcomes as the level of exchange rate depreciation, the deceleration in GDP growth, and the improvement in the current account balance (Freund and Warnock 2005, 3).

Of the preconditions studied by Freund and Warnock, they find that larger current account deficits are associated with a comparatively lower rate of income growth during recovery and a longer recovery period (Freund and Warnock 2005, 12 and 21). They also find that deficits driven by consumption and government deficit growth require greater real exchange rate depreciation than those that are driven by investment (Freund and Warnock 2005, 12). Finally, Freund and Warnock find that for deficits associated with greater bond inflows there appears to be larger increases in interest rates following the reversal (Freund and Warnock 2005, 15).

Croke, Kamin, and Leduc (2005) evaluate whether past episodes of current account adjustment in industrialized countries exhibit "features similar to those described by the disorderly correction scenario" (Croke Kamin and Leduc 2005, 5). They define the disorderly correction scenario as a chain of events in which depreciation in real exchange rate causes a simultaneous rise in interest rates and fall in stock prices, both of which work to trigger a recession (Croke Kamin and Leduc 2005, 2).

Croke, Kamin, and Leduc (2005) do not find any substantial evidence of past reversal episodes that exhibit characteristics that fit the disorderly correction hypothesis. For episodes that experienced a slowdown of GDP growth, they find no association with real exchange rate depreciation, interest rate increase, or real stock prices decrease. For episodes during which an increase in GDP growth occurred following the beginning of adjustment, their results suggest that a significant depreciation in real exchange rate occurs (Croke, Kamin, and Leduc 2005 6). Overall, these findings weaken the argument for disorderly correction scenario.

Edwards (2005) paper analyzes "the relationship between the U.S. dollar and the US current account" and evaluates possible consequences of a reversal event in which the US current account deficit decreased sharply and suddenly by 3 to 6 percent of GDP (Edwards 2005, 3). He finds that a US deficit reversal of 3 to 6 percent GDP would involve an accumulated real exchange rate depreciation of 21 to 28 percent in the first three years following an adjustment. Edwards (2005) also finds that current account deficit reversals tend to correlate with substantial declines in GDP growth (Edwards 2005, 41).

Despite the extensive literature on current account deficit reversals, there has been surprisingly little empirical work done on current account surplus reversals. In fact, only two major publications on the topic currently exist.

Edwards (2007) analyzes the nature of adjustments in current account surplus countries and asks "whether a realignment of world growth rates—with Japan and Europe growing faster and the US growing more slowly—is likely to solve current global imbalances" (Edwards 2007, 2). Edwards's (2007) results suggest that for large and high-income economies, an appreciation in real exchange rate occurs during the period of surplus adjustment (Edwards 2007, 27). Edwards finds no significant trend for either investment or GDP growth in the years following a surplus reversal, but he does find a small increase in interest rates for the same period (Edwards 2007, 28). Edwards also finds a deterioration of the terms of trade, relative to the previous year, for the year of the reversal (Edwards 2007, 28).

Most importantly, Edwards's results suggest that "a well-defined and sharp 'typical' behavior," similar to the one that exists for the case of large and abrupt current account deficit reversals, does not exist for reversals of the current account surplus (Edwards 2007, 29). Additionally, Edwards argues, based on his results, any correction of global imbalances will require a significant adjustment of the current account surpluses in China and many oil-exporting countries (Edwards 2007, 25).

Comment: If there is a particular result that is very important for your own results, be sure to highlight it.

IMF (2010) evaluates the growth outcomes of current account surplus reversals that are driven by policy and works to identify the components that drive changes in growth. IMF (2010) finds no association between policy-induced reversals and slower growth. In fact, results suggest that during policy-induced surplus reversals, total employment increased to some extent (IMF 2010, 2). Additionally, the study finds considerable deviation among growth outcomes (IMF 2010, 7 and 8).

Regarding the components that drive the variation in income growth, IMF (2010) finds that better terms of trade, higher real world output, and trade liberalization are all associated with faster income growth in reversal period. Larger initial current account surpluses and greater real exchange rate appreciation in the pre-reversal period, on the other hand, are both negatively associated with growth following the reversal (IMF 2010, 10 and 12).

Both Edwards (2007) and IMF (2010) find no evidence of a systematic relationship between current account surplus reversals and income growth or real exchange rate adjustment, a result that is replicated here. However, neither article discusses what economic conditions might explain the lack of a systematic relationship. Edwards (2007) does not address the issue at all, and IMF (2010) is concerned only with what it considers "policy-induced" episodes of reversal. The paper looks to fill that void by addressing how certain aspects of the buildup of the current account surplus are associated with more or less severe outcomes for all surplus reversals.

Comment: You can use your literature review as a way to frame the motivation for your study.

III. Methodology

This paper includes a two-part analysis for which two separate methods of regression analysis are used. The first is a set of OLS regression equations that regress GDP growth and REER on a lagged dependent variable; dummy variables for each of the six years around a reversal (years -2 through 3); and a fixed effect for country and year. This regression equation is based on that used in Freund (2005) to characterize deficit

Comment: When writing your analysis, you have to chose what person in which you plan on writing. Some authors use first, some (like this author) use the third person, and some even use the "royal we." Whatever you chose, make sure you are always consistent.

reversals. The lagged dependent variable is included to capture trends in GDP and REER change and the six dummy variables are used to test for an association between surplus reversals and higher or lower GDP and REER change. Finally, the fixed effects for country and year are included to control for GDP and REER trends in a particular country and on a global scale.

The second analysis consists of a set of OLS regression equations that regress GDP growth and exchange rate adjustment in the reversal period on several preconditions of current account surplus. This model of regression equation is based on that used in Freund and Warnock (2005). The inclusion of several preconditions is done to establish whether one of such preconditions is associated with higher or lower GDP growth or REER adjustment. Both sets of equations will be explained in greater detail in sections IV and V.

Comment: If your method has a basis in the literature, mention it! Intuitively, we want to show that we came up with our ideas all on our own, but often in economics, showing that your ideas are supported by existing literature gives legitimacy to your work.

Episode Identification

The identification of surplus reversal episodes for this study is based on that used in deficit reversal literature, including Milesi-Ferretti and Razin (1998), Freund (2005), and Freund and Warnock (2005), and recent surplus reversal literature, IMF (2010). For the purposes of this study, a current account surplus reversal is defined as satisfying three distinct criteria:

Comment: How you are identifying whatever it is that you are studying often seems like second nature to the author, but to the reader, it can be very confusing.

1) During the period preceding the reversal, there is a large and persistent current account surplus: In the three years before the reversal (noted as years -2, -1, and 0), the current account surplus must average at least 2 percent of GDP. To mitigate the influence of outliers, the surplus must exceed 2 percent of GDP in at least two of the three years preceding the reversal year.
2) Following the reversal, a significant narrowing of the surplus must occur: The average current account surplus in the three years starting with the reversal year (noted as years 1, 2, and 3) must be at least 2 percentage points of GDP less than the average in the three years before the reversal.
3) The narrowing of the surplus must be sustained, not a sharp and temporary change: the maximum surplus in the three years following the reversal must be smaller than the minimum surplus in the three years preceding the reversal.

Sixty-three episodes were identified in fifty-two countries out of a dataset containing 172 countries and 39 years (6708 observations total). Nine of the episodes identified occurred in OECD member countries and five occurred in OPEC member countries. Ten of these countries had two or more surplus reversals. A full list of reversal episodes can be found in the appendix.

Year Specification and Identification of Reversal Periods

For the purpose of this study, episodes of current account surplus reversal are six years in length. These years are identified as -2, -1, 0, 1, 2, and 3. Year 0 signifies the year *before* the current account (as a percent of GDP) begins its decline from surplus. In other words, year 1 represents the first year of "reversal." This method of labeling is consistent with the literature on deficit reversals.

Comment: Passive voice construction! Oh my! In economics writing, frequently the object of your sentence is actually the important section. This is because you are usually the subject! This sentence could be restructured as "I identified these years as…", but such a construction could take the focus away from the identification.

Throughout this paper, the terms "pre-reversal period" and "reversal period" will be used. The pre-reversal period consists of years -2 through 0 and the reversal period consists of years 1 through 3.

IV. The Dynamics of Current Account Surplus Adjustment

This section evaluates how current account surplus reversals can be characterized in terms of income growth and real effective exchange rate adjustment. Specifically, this analysis addresses whether such a characterization can be made along line of industrialization (developed versus developing nations) and oil-export dependency (petroleum-based and non-petroleum-based economies). The aim of this analysis is to determine how current account surplus reversals can be characterized and find whether there is a distinct and archetypal case of surplus reversal regarding GDP growth and REER adjustment.

Comment: Section topic sentences can feel redundant, but they are actually incredibly helpful for the reader.

Comment: Stating your purpose clearly and concisely is a great way to strengthen your paper.

A Descriptive Analysis

This section of analysis evaluates the average income growth and REER adjustment during a current account surplus reversal based on descriptive statistics. Average annual change in GDP and average annual rate of REER appreciation (depreciation)[4] were calculated for the pre-reversal and reversal periods and the differences between the two were taken. This data was then aggregated in terms of average, median, and standard deviation. This calculation was done six times with six different subsamples: all countries; OECD countries only; non-OECD countries; OPEC countries only; non-OPEC countries; and non-OECD, non-OPEC countries.

The results reported in Table 1 show a clear pattern with regard to the sign and magnitude of the average difference in average annual GDP (REER) change between the pre-reversal and reversal periods. The subsample that includes only non-OECD/non-OPEC countries has the highest magnitude with negative signs for both GDP and REER change. The subsample that includes OPEC countries has the highest magnitude with positive signs for both GDP and REER change.

Table 2 shows the descriptive statistics for the subsample that includes all countries. Average GDP average annual change decreases from 2.23 percent in the pre-reversal period to 1.62 percent in the reversal period. The average difference in average annual GDP change amounts to -0.66 percentage points. Average REER average annual change decreases from 0.18 percent in the pre-reversal period to -0.52 percent in the reversal period, representing a -0.95 percentage point change from appreciation to depreciation.

Developing versus Developed Countries

For OECD-member countries (Table 3), average GDP average annual change decreases from 2.50 percent in the pre-reversal period to 1.99 percent in the reversal period, with an average difference of -0.51 percentage points. Average REER average annual change increases from -0.03 percent to 0.05 percent, representing a 0.08 percentage point switch from depreciation to appreciation.

For non-OECD member countries (Table 4), average GDP average annual growth decreases from 2.19 percent to 1.56 percent, with an average difference of -0.69 percentage points. Average REER rate of change also decreases, from 0.25 percent to -0.82 percent, a -1.28 change from appreciation to depreciation.

Petroleum-Based versus Non-Petroleum Based Economies

For OPEC-member countries (Table 5), average GDP average annual change increases (the only subsample to do so) from -0.13 percent in the pre-reversal to 2.57

[4] An increase in REER represents appreciation, a decrease depreciation.

percent in the reversal period. This amounts to a 2.70 percentage point increase. Average REER rate of change also increases, from -3.62 percent to 1.53 percent and has an average difference of 5.15 percentage points. It should be noted that this subsample is the only one of the six to experience an increase in both average GDP and REER average annual change.

Non-OPEC member countries (Table 6), on the other hand, experience a decrease in both characteristics. Average GDP average annual change decreases from 2.50 percent to 1.52 percent. The average difference in GDP average annual change between the two periods is -1.04 percentage points. Average REER average annual change decreases from 0.79 percent to -0.86 percent, a -1.93 change from appreciation to depreciation.

Comment: You can present your results as a whole unit (as done here) followed by interpretation.

Based on these results, one might expect to see a negative relationship between current account surplus reversal and both GDP growth and REER adjustment for subsamples including all countries, non-OECD countries, non-OPEC countries, and non-OECD/non-OPECD countries. For OECD countries, one might expect a negative relationship with GDP growth and a positive one with REER. Finally, for OPEC countries, one might expect a positive relationship with both GDP growth and REER adjustment.

Multivariate Analysis

In this section, GDP growth and exchange rate adjustment are regressed on a lagged dependent variable; six dummy variables for years -2 through 3; and a fixed effect for country and year using OLS regression equations. These equations resemble those used in Freund (2005).

Comment: This can feel like an awkward phrase to those unfamiliar with it. Also, it uses passive verb construction! But, believe it or not, its correct. It is also a great way to explain exactly what you are doing.

Equation i: GDP Change (Growth)

$$\Delta y_{j\,t} = \alpha \Delta y_{j\,t-1} + \beta_{-2} s_{-2} + \beta_{-1} s_{-1} + \beta_0 s_0 + \beta_1 s_1 + \beta_2 s_2 + \beta_3 s_3 + \gamma_j + \mu_t$$

Equation ii: Real (effective) exchange rate change

$$\Delta reer_{j\,t} = \alpha \Delta reer_{j\,t-1} + \beta_{-2} s_{-2} + \beta_{-1} s_{-1} + \beta_0 s_0 + \beta_1 s_1 + \beta_2 s_2 + \beta_3 s_3 + \gamma_j + \mu_t$$

Variable Description

Comment: Describe each of your variables and what they mean.

For Equation i, found above, the dependent variable is GDP growth, measured as percent change,[5] in country j, year t. For Equation ii, the dependent variable is REER change, also measured as percent change,[6] in country j, year t. REER is defined such that an increase in REER represents appreciation.

The lagged dependent variable takes on the value of GDP or REER percent change in the previous year. This variable is included so as to address potential trends in GDP and REER change.

The six dummy variables (s_s) each take on the value of 1 if the observation in question represents a year during which that particular country was at the point in the reversal period specified by the variable itself. For example, s_0 equals one for South Africa 1980 as that year represents the year immediately preceding reversal (year 0) for that country and s_1 equals one for South Africa 1981 as that year represents the first year of reversal (year 1) for that country. This pattern continues with s_{-2} taking on a value of one for South Africa 1978, s_{-1} equaling one for South Africa 1979, s_2 equaling one for South Africa 1982, and finally, s_3 equaling one for South Africa 1983. This method of using six

Comment: This way of explaining these variables might seem redundant to the author, but always remember that you are the only one who is that familiar with your equations!

[5] Data for GDP growth was measured as percent change in decimal form, i.e. 0.3 in lieu of 30%.

[6] Data is also measured in decimal form, as mentioned in footnote 4.

dummy variables to identify correlations between a particular year in a reversal and changes to GDP and REER change is consistent with that used in Freund (2005).

The coefficients on s_{-2} through s_3 will be interpreted as representing an associated between the year of reversal defined by the variable (i.e. year -1 for s_{-1}) and GDP change or REER rate of change. For example, a positive, statistically significant, coefficient on variable s_{-1} in Equation i would be interpreted as an association between year -1 of the reversal and increased GDP growth.

Comment: For any sort of unusual analysis, offer insight on how those variables will be interpreted.

The variable for country fixed effects is included to control for country-specific GDP growth and REER adjustment trends. This variable (γ_j) takes the form of 172 dummy variables, each representing a different country in the dataset, which take on a value of one when the observation represents the country determined by the variable. For example, for dummy variable "Barbados," only the 39 observations that occur in the country of Barbados take on the value of one.

Finally, the fixed year effect, (μ_t) is made up of 39 dummy variables, one for each of the years in the data set. The dummy variable takes on the value of one if the reversal occurred in the year noted by the variable. For example, the variable for 1980 takes on a value of one for the 172 observations that occur in that year. This variable is included to control for global macroeconomic GDP growth and REER trends and is consistent with the regression analysis done in Freund (2005). Information regarding the data used in these equations can be found in the data appendix.

Dataset Description

The data set contains 6708 observations. Each one represents a particular country during a particular year. 172 countries are represented over a period of 39 years (1970-2009). The data set is restricted to countries with a 2009 GDP per capita of more than $1000 in 2005 PPP terms and a 2009 population over half a million. These criteria eliminated five countries from the data set and are similar to that used in Edwards (2007). Another eighteen countries were eliminated due to a lack of available data.

Comment: To spell out or not to spell out? Whatever you choose, be consistent. A common rule is to write out numbers less than 10 and to use numerical description for numbers 10 and higher.

Methodology

Each regression equation was run six times with six subsamples of data: the first includes all countries, the second excludes non-OECD member countries, the third excludes OECD member countries, the fourth excludes non-OPEC member countries, the fifth excludes OPEC member countries, and the sixth excludes both OPEC and OECD member countries. This division of the dataset into subsamples was done to determine if a pattern would emerge along the lines of developed versus developing countries and petroleum-based versus non-petroleum based economies.

The results of Freund (2005) and Milesi-Ferretti and Razin (1998) suggest that there are differences regarding GDP change and REER rate of change between industrialized and developing countries following current account deficit reversals. The analysis done here endeavors to establish whether a similar difference exists for surplus reversals.

Results and Interpretation

GDP Growth

In comparing results from the six different subsamples, it becomes clear that current account surplus reversals correlate with different patterns of GDP growth for

developing versus developed countries and petroleum versus non-petroleum based economies.

When the subsample includes all countries, excludes OECD members, OPEC members, and excludes both OECD and OPEC member countries (Tables 8, 10, 12, and 13 respectively), the coefficient on s_{-2} is consistent in sign (negative), magnitude (approximately 0.026), and statistical significance (1 percent and 5 percent levels). When the subsample includes OECD member countries only (Table 9), the coefficient on s_{-2} decreases in magnitude and loses its statistical significance. When the subsample includes OPEC member countries only (Table 11), the coefficient increases in magnitude, but still loses its statistical significance.

Additionally, when the subsample includes OECD member countries only (Table 9), the coefficient on s_{-1} becomes statistically significant at the 1 percent level and has a magnitude of 0.022. For the subsample that includes OPEC member countries only (Table 11), the coefficient on s_1 is 0.12 and is statistically significant at the 5 percent level.

These results show that for developing (non-OECD member) countries, the third year before a country's current account surplus begins to decline (year -2) is correlated with a 3 percent decrease in GDP growth (Table 10). For developed (OECD-member) countries (Table 9), such a statistically significant correlation does not exist. This result suggests that current account surpluses are associated with slower GDP growth in the pre-reversal for developing economies.

Comment: Be careful of your word choice regarding the interpretation of your results. There is a difference between what your results show (the actual correlation) and what they suggest (the interpretation).

In the case of developed countries, the second year before their current account begins to reverse from its surplus (year -1) is correlated with a 2.2 percent increase in GDP growth (Table 9). This result suggests that current account surpluses in high-income countries are associated with higher than average growth. Because this high growth is not found during and following the surplus reversal, these results imply a deceleration of GDP growth during the reversal period for developing countries.

However, these results fail to establish as strong and significant pattern of GDP growth slowdown such as that found by Freund (2005), who conducted a similar study using dummy variables for reversal years of current account deficit reversals. For industrial countries, Freund finds a positive and significant relationship between income growth and the first year preceding a reversal, and a negative and significant relationship between income growth and the first and second years after a reversal (Freund 2005, 1294). Freund's results imply a pattern of substantial GDP growth slowdown following a current account deficit reversal for industrial countries that is not found in the case of current account surplus reversals.

Comment: Stay away from phrases such as "prove xyz does not exist." "fail to establish" is often a better option. You want to make sure you are not making statement that your results do not support.

Comparing the results from the OPEC-member-countries-only subsample and the subsample that excludes such countries yields a similarly clear pattern. These results show that for non-petroleum-based economies, the third year before a country's current account begins to reverse from its surplus (year -2) is correlated with a 2.7 percent decrease in GDP growth. This result suggests that current account surpluses are associated with slower growth in the pre-reversal period for non-OPEC member countries.

For petroleum-based economies, the first year of reversal from a surplus (year 1) is correlated with a 12.1 percent increase in GDP growth. These results are consistent with the descriptive analysis done earlier in this paper, which found a 2.7 percentage point increase in average annual GDP change between the reversal and pre-reversal periods. These results suggest that in petroleum-based economies, current account surplus

reversals are associated with increased GDP growth in the reversal period. However, this result is counterintuitive given the nature of the current account.

Current Account Surplus Reversals in Petroleum-Based Economies

Because the current account of most nations is primarily made up of the balance of trade and for petroleum-based economies, oil is the primary export, one might expect a current account surplus reversal in oil-exporting countries to correlate with a decrease in GDP growth. However, it is certainly possible that while the current account of an oil-exporting nation is decreasing, oil production, and therefore GDP growth, can be increasing if oil prices are also falling.

An evaluation of the seven episodes of current account surplus reversal occurring in OPEC-member countries yields little support for this hypothesis. Oil rents (as a percent of GDP) decrease between years 0 and 1 for six out of the seven episodes (Figure 1) and oil prices (dollars per barrel) decrease between years 0 and 1 for five out of the seven episodes (Figure 2). This information would suggest that an increase in production could easily explain the result of increased income growth associated with a current account surplus reversal found above. However, oil production actually *decreased* between the years 0 and 1 for six of the seven episodes (Figure 3). This information points to growth in the non-oil sector of these economies as the source of the increased GDP growth associated with year 1 of a current account surplus reversal.

Real Effective Exchange Rate Change

The regression results for real effective exchange rate as the dependent variable yielded no statistically significant correlations for years -2 through 2. These results show that for current account surplus reversals, unlike current account deficit reversals, there appears to be no significant relationship between a particular year of reversal and real effective exchange rate adjustment. This result contrasts with the relationship between REER adjustment and current account deficit reversals. Freund (2005) finds a negative and significant relationship between the first year after a reversal and real effective exchange rate appreciation (Freund 2005, 1294).

Because a fair amount of real effective exchange rate data was unavailable, decreasing the number of observations from 6708 to 2674, a robustness check was done using real exchange rate (in relation to the US dollar) instead. Regression results for real exchange rate as the dependent variable yields results different from those of real effective exchange rate regarding sign, magnitude, and statistical significance. When all countries are included (Table 14, column 1), the coefficient on s_{-1} is 0.30 and is statistically significant at the 5 percent level, implying that a 30 percent acceleration in RER appreciation coincides with the second year before a current account begins to reverse from surplus. When the subsample excludes OPEC member countries and OECD member countries (Table 14, columns 3 and 5), the coefficient increases slightly in magnitude (to 0.333 and 0.354 respectively) and maintains its statistical significance at the 5 percent level.

For all other subsamples, the coefficient on s_{-1} fails to retain its statistical significance. When the subsample includes OECD member countries only, the coefficient becomes negative. For OPEC countries only, the magnitude decreases significantly, to 0.086 (Table 14). These results suggest that the relationship between RER appreciation and the second year before a reversal of the current account surplus is driven by developing, non-net-oil-exporting countries.

These results show a significant increase in appreciation of real exchange rate for both developing and non-petroleum based economies in the second year before the surplus reversal occurs. This interpretation suggests that current account surplus reversals in developing and non-petroleum based economies are preceded by RER appreciations.

Overall, this section of analysis supports the suggestion that there is no distinct and archetypal case for current account surplus reversals. This section finds that for developed countries, the second year before a surplus reversal begins (year -1) is associated with a 2.2 percent increase in GDP growth. This result suggests that a deceleration in growth occurs following a surplus reversal in a developed economy. Also regarding income growth, this section found that for petroleum-based economies, the first year of reversal (year 1) is associated with a 12.1 percent increase in GDP growth that is driven by growth in the non-oil sector. On the other hand, for developing and non-petroleum-based economies, results from this section suggest that surpluses in such economies are associated with slower growth.

Comment: At the end of any section of analysis, be sure to say whether the results support or refute your initial hypothesis. Use explicit language when discussing this point.

Regarding real effective exchange rate, no relationship with surplus reversal was found. But for real exchange rate (relative to the US Dollar), a 30 percent acceleration in appreciation occurs in the second year before the reversal (year -1) in developing and non-petroleum-based economies.

VI. Conclusion

This paper provides substantial support for the suggestion that current account surplus reversals, unlike current account deficit reversals, are not associated with any kind of definite or representative behavior. This paper finds evidence that implies a slowdown in GDP growth following current account surplus reversals in developed countries and an acceleration of GDP growth following a reversal for petroleum-based economies. For developing and non-petroleum-based economies, results in this paper suggest that surpluses in such nations are associated with slower GDP growth and an acceleration of RER appreciation in the pre-reversal period.

Comment: When concluding your paper, be explicit and forthcoming about whether your results support or refute your initial hypothesis.

Comment: "This paper" is a simple and clear subject when explaining results.

Additionally, this paper finds that for episodes associated with surplus greater than 6 percent of GDP, growth of consumption and government expenditure relative to GDP in the pre-reversal period are both associated with a small decrease in the difference between GDP growth in the three years beginning with the reversal and long-term average GDP growth. Concerning REER adjustment, the size of the surplus preceding a reversal is associated with a slight acceleration of REER depreciation in the reversal period for episodes associated with surplus greater than 6 percent of GDP.

Most importantly, this paper finds no support for a systematic characterization of current account surplus reversal outcomes. Furthermore, the variation in outcomes found between developing versus developed and petroleum-based versus non-petroleum based economies provides further support for the suggestion that such a systematic characterization does not exist for episodes of surplus reversal.

These results are consistent with the minimal literature that is available on the subject of surplus reversals. Both articles, Edwards (2007) and IMF (2010), provide support for this papers finding that a systematic characterization of surplus reversals does not exist. Additionally, this paper's finding of a wide variation of growth outcomes among reversals is supported by a similar finding in IMF (2010). However, this paper differs from the literature in that it evaluates the dynamics of GDP and REER outcomes for *all* current

account surplus reversals, regardless of their cause, and analyzes the correlation between their preconditions and outcomes.

Due to the lack of published empirical work regarding current account surplus reversals, there is a great deal of room for further research. Since this paper has established that no systematic characterization of surplus reversals exists, the next logical step would be to study the differences between the dynamics of deficit reversals and surplus reversals to address the question of why such a typical case exists for the reversal of a current account deficit but not for the reversal of a surplus. In addressing this question, both a correlative and causational study would be beneficial.