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Hyeongwoo Kim*, Madeline H. Kim, Divya Sadana*, and Jie Zhang†

*Auburn University, †Hunan University

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Hyeongwoo Kim*, Madeline H. Kim, Divya Sadana†, and Jie Zhang‡

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Abstract

Donald Trump claimed that the free trade agreement with Korea (KORUS FTA) was a horrible deal because the U.S. trade deficit increased substantially after the agreement went into effect in March 2012. However, similar deteriorations occurred during the same period in the U.S. trade balances with most other major trading partners, even though none of them had an FTA with the U.S. We investigate the causal effects of the KORUS FTA on the trade account balance between the U.S. and Korea via the difference-in-differences approach. Our empirical analysis provides strong evidence in favor of Trump's claim, controlling for potential impacts of economic fluctuations over time.

Keywords: KORUS FTA; Trade Deficit; Difference-in-Differences; Causal Effect

JEL Classification: F13; F14

*Department of Economics, Auburn University, Auburn, AL 36849. Tel: +1.334.844.2928. Email: gmmkim@gmail.com.

†Department of Economics, Auburn University, Auburn, AL 36849. Email: dzs0068@auburn.edu.

‡Center for Economics, Finance and Management Studies, Hunan University, China. Tel: +86.137.3656.4717. Email: jiezhangtz@hnu.edu.cn

I Introduction

During his 2016 Presidential campaign, Donald Trump often criticized the Korea-U.S. Free Trade Agreement (KORUS FTA) as a horrible deal and threatened to terminate it. Although the U.S. noticed an increased trade deficit in goods with Korea after the KORUS FTA's enactment in March 2012, this trend is not exclusive to Korea. The U.S. also experienced a higher trade deficit with 7 out of 11 major trading partner countries during the same period even though none of these countries had an FTA with the U.S.

We realize Trump's political motivations for his claim, but proper assessment of it would be highly informative to policy makers given the heterogeneous effects of FTAs on international trade flows, as highlighted in the work of Baier *et al.* (2019). One important challenge is how to deal with endogeneity bias in estimating the FTA treatment effect. See, among others, Baier and Bergstrand (2007, 2009), Anderson and Yotov (2016), and Cho *et al.* (2022) for possible resolutions.

This paper investigates the causal treatment effects of the KORUS FTA on the American trade account balance with Korea using the difference-in-differences approach (Card and Krueger, 1994) with the aforementioned 11 other trading partner countries as control groups. In addition to country fixed effects and time fixed effects, we include the real industrial production ratio and the real exchange rate to control for income/absorption effects and expenditure-switching effects caused by economic fluctuations over time.

Our research shows that the increases in the U.S. trade deficits with the control group countries can be explained by the American economy's comparatively stronger performance or real appreciations of the dollar during the post-FTA period, while the KORUS FTA indeed raised the U.S. deficit with Korea notwithstanding the stronger performance of the Korean economy and the real depreciation of the dollar *vis-à-vis* the Korean won. That is, our findings provide strong empirical support for Trump's claim that the trade deficit increased after the FTA was first enacted.

The rest of the paper is organized as follows. Section II describes the data employed in the paper. We also provide some useful insights from the data. In Section III, we report and interpret our major findings. Section IV concludes.

II Data Description and Some Insights from the Data

1. Data Description

The United States and the Republic of Korea signed the KORUS FTA on June 30, 2007, which went into effect on March 15, 2012. Donald Trump began working on negotiations soon after his tenure as the 45th President of the United States on January 20, 2017. Given this timeline, the post-treatment (KORUS FTA)

period spans the 58 months between March 2012 to December 2016, starting with the month that the KORUS FTA first went into effect and ending with the last month before Trump's presidency began. The pre-treatment sample period, therefore, includes the last 58 months prior to the KORUS FTA from May 2007 to February 2012.

We obtained the U.S. trade in goods data with the top 15 trading partner countries from May 2007 to December 2016 from the United States Census Bureau. We adjusted the data for seasonality using the X12-ARIMA procedure. Vietnam was excluded due to the lack of other control variable data. Canada and Mexico were additionally excluded since they had the North American Free Trade Agreement (NAFTA) with the U.S., which was enacted in 1994 prior to the KORUS FTA, then replaced by the U.S.-Mexico-Canada Agreement (USMCA) on July 1, 2020.[1] Hence, our analysis assumes that South Korea is the treatment country, while the remaining 11 countries are considered as control countries.[2]

We define the deficit ratio as the U.S. trade account deficit (imports minus exports) divided by the trade volume (imports plus exports) with the partner country. To measure the income/absorption effect on the trade deficit, we employ the ratio of industrial production (IP), that is, the U.S. real IP divided by the real IP of the partner country. Real IP is nominal IP deflated by its CPI. All IP and CPI data are seasonally adjusted and were obtained from the Federal Reserve Economic Data (FRED) except for those of Taiwan that were acquired from the National Statistics, Republic of China (Taiwan). All nominal bilateral foreign exchange rates relative to the U.S. dollar were also obtained from the FRED. We converted them to CPI-based real exchange rates, then log-transformed.

2. Useful Insights from Key Trade-Related Data

Table 1 reports the average values of the key variables of interest: deficit ratios, IP ratios, and real exchange rates during the pre-FTA (May 2007 to February 2012) and the post-FTA (March 2012 to December 2016, Treatment) periods. The numbers in bold indicate that the average value is greater in the post-FTA period than the pre-FTA average.

As we mentioned before, South Korea was not the only trading partner of which the deficit ratio rose after the KORUS FTA went into effect. 7 out of 11 other major trading partners also experienced greater trade surplus (bold numbers) with the U.S. during the same period even though none had an FTA with the U.S. See also Figure 1 that clearly shows very similar deficit dynamics of the U.S. with Germany, India, and Italy as that with Korea.

[1] The USMCA was initially signed on November 30, 2018. Later, its revision was signed on December 10, 2019.
[2] They are China, Japan, Germany, the U.K., France, India, Taiwan, the Netherlands, Brazil, Ireland, and Italy.

Table 1 and Figure 1 around here

It should be also noted that these 7 higher deficit countries experienced either higher average IP ratio or higher average real FXR, or both, during the post-FTA era. Since IP ratio is defined as $IP_{US,t}/IP_{j,t}$, higher IP ratio implies a stronger economic performance of the U.S. relative to that of the partner country, meaning that the American economy is likely to import more from the partner country, resulting in increased deficits during the post-FTA era. Higher Real FXR of the U.S. dollar also means that the U.S. trade deficit is likely to increase with the partner country due to an expenditure-switching effect.

Putting it differently, the rising U.S. trade deficits with these control group countries during the post-FTA period might have been caused by either stronger performance of the American economy or the real appreciation of the U.S. dollar.

On the other hand, Korea experienced none of these, implying that business cycle conditions during the post-FTA period could have been consistent with a lower trade deficit of the U.S. with Korea. That is, the observed higher U.S. trade deficit with Korea might have been indeed caused by the KORUS FTA.

In what follows, we implement econometric tests to statistically evaluate this conjecture via the difference-in-differences approach.

III. Difference-in-Differences Estimation and Interpretation of the Results

This section estimates the causal effect of the KORUS FTA on the U.S. trade deficit with South Korea via the difference-in-differences (diff-in-diff) estimator. We propose the following regression equation.

$$USDef_{i,t} = \alpha + \beta_1 treated_{i,t} + \beta_2 post_{i,t} + \beta_3 treated_{i,t} \times \beta_2 post_{i,t} + \beta_4 ipratio_{i,t} + \beta_5 rfxr_{i,t} + \gamma_i + \varepsilon_{i,t}, \quad (1)$$

where $treated_{i,t}$ is the dummy variable that takes the value of 1 for Korea (treatment) and 0 for control group countries. $post_{i,t}$ is the dummy variable that takes the value of 1 for the post-KORUS FTA period (treatment period, March 2012 to December 2016) and 0 for the pre-KORUS FTA period. β_3 is the difference-in-differences coefficient, which is crucial for our study.

Two control variables, $ipratio_{i,t}$ and $rfxr_{i,t}$, are added in the regression equation to control for possible business cycle effects, income/absorption effects and expenditure-switching effects, respectively. In addition to the time fixed effects (not reported), we also include the country fixed effects (γ_i) when there are multiple control countries. Since our regression equation utilizes time series variables with 116 monthly

observations, we employ the Newey-West HAC (Heteroskedasticity and Autocorrelation Consistent) standard error in the presence of serial correlations in the data.[3]

Table 2 reports estimation results with all 11 control group countries among major trading partners. In all four specifications, we obtained significantly positive estimates $\hat{\beta}_3$ at the 1% level, which is consistent with a positive causal effect of the KORUS FTA on the U.S. trade deficit with South Korea. The coefficient estimates for control variables have correct signs, that is, positive $\hat{\beta}_4$ and $\hat{\beta}_5$, although they may not be always significant.

Table 2 around here

We implement similar estimations with more disaggregated level data. In Table 3, we report estimation results with two different control groups: Euro-Zone countries in Panel A and non-Euro-Zone countries in Panel B. The former includes France, Germany, Ireland, Italy, and the Netherlands, while the latter includes the rest of the 6 partner countries. We also report the results for individual countries.

Again, we obtained significantly positive diff-in-diff estimates $\hat{\beta}_3$ in all cases at the 5% level with two exceptions, Germany and Italy. The coefficients of $ipratio_t$ and $rfxr_t$ have correct signs whenever they are statistically significant except for Taiwan for $rfxr_t$. It is interesting to observe that $\hat{\beta}_3$ is not statistically significant for Germany and Italy. Recall that these countries exhibited strikingly similar dynamics of the U.S. trade surplus as in Korea (see Figure 1). Therefore, the insignificant $\hat{\beta}_3$ estimates for these two countries seem to result from lack of sufficient variations in the data.

Putting it all together, we conclude that our exercise provides strong evidence of a positive causal effect of the KORUS FTA on Korea's trade account balance with the U.S.

Table 3 around here

IV Concluding Remarks

Mr. Trump criticized the KORUS FTA as a job-killing trade deal, pointing out the rising U.S. trade deficit with Korea after the deal came into effect in March 2012. However, 7 out of 11 major trading partners also experienced similar increases in the trade surplus with the U.S. during the same period, despite none of them having an FTA with the U.S. This makes it difficult to evaluate the causal effects of the KORUS FTA on the trade account balance with Korea.

[3] We implemented the regression with 3-month bandwidth selections for the Bartlett kernel for the NW estimator. Results with 6- and 9-month bandwidth are qualitatively similar and available upon request.

Employing the difference-in-differences approach, we have found strong empirical support for Trump's conjecture. Our findings demonstrate that rising American trade deficits with other trading partner countries were mostly due to a stronger performance of the American economy or the real appreciation of the U.S. dollar. Business cycle conditions were the opposite in Korea, and our analysis concludes that the KORUS FTA indeed caused the greater U.S. trade deficit with Korea after its enactment.

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Figure 1. U.S. Trade Deficit Ratios: Selective Trading Partners

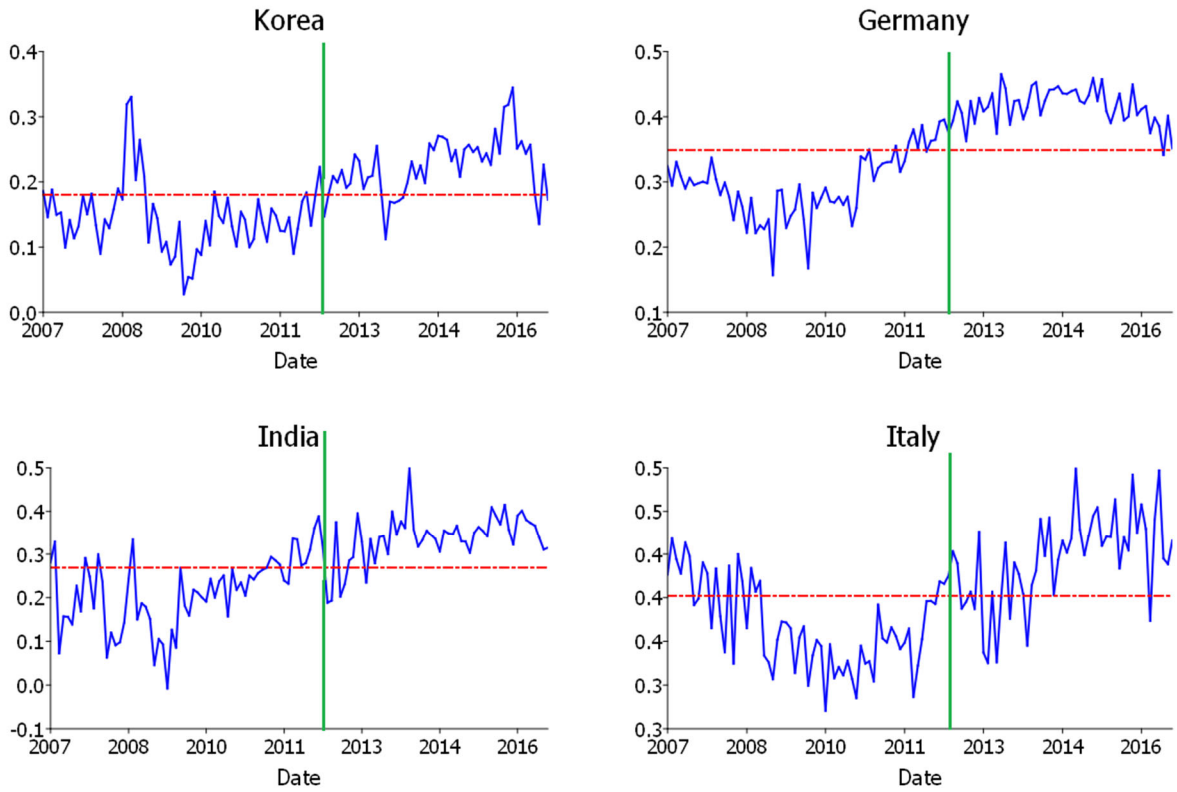

Table 1. Summary Statistics of Major Trading Partners

	Deficit Ratio		*IP Ratio*		*Real FXR*	
Countries	Pre-FTA	Post-FTA	Pre-FTA	Post-FTA	Pre-FTA	Post-FTA
			Treatment Country			
Korea	0.142	**0.219**	0.464	0.431	7.910	7.879
			Control Group I: Euro-Zone Countries			
France	0.179	**0.193**	0.406	**0.436**	0.507	**0.657**
Germany	0.286	**0.411**	0.449	0.438	0.520	**0.661**
Ireland	0.621	**0.637**	0.699	0.580	0.469	**0.653**
Italy	0.372	**0.431**	0.367	**0.434**	0.526	**0.657**
Netherlands	-0.296	-0.373	0.391	**0.423**	0.542	**0.664**
			Control Group II: Non-Euro-Zone Countries			
Brazil	-0.105	-0.143	0.286	**0.396**	1.729	**1.882**
China	0.622	0.591	0.338	**0.398**	2.844	2.714
India	0.202	**0.336**	0.328	**0.420**	5.069	5.031
Japan	0.341	**0.351**	0.421	**0.429**	5.341	**5.502**
Taiwan	0.199	**0.213**	0.532	0.448	4.291	**4.296**
UK	0.016	0.016	0.380	**0.435**	0.369	**0.429**

Table 2. Diff-in-Diff Estimation: U.S. Deficit with all Control Group Countries

	US Deficit Ratio			
	(1)	(2)	(3)	(4)
Treated=1 (β_1)	0.276‡	0.269‡	-0.051	-0.093
	(0.017)	(0.017)	(0.205)	(0.200)
Post=1 (β_2)	-0.034	-0.033	-0.043*	-0.043*
	(0.024)	(0.025)	(0.025)	(0.025)
Treated=1 * Post=1 (β_3)	**0.056**‡	**0.059**‡	**0.062**‡	**0.067**‡
	(0.014)	(0.014)	(0.014)	(0.014)
ipratio (β_4)		0.054		0.066
		(0.059)		(0.057)
rfxr (β_5)			0.053	0.059*
			(0.033)	(0.033)
Country FEs	Yes	Yes	Yes	Yes
Time FEs	Yes	Yes	Yes	Yes
Observations	1392	1392	1392	1392

Note: Newey-West HAC standard errors are in parenthesis. Superscript ‡, †, and * denote a statistical significance at the 1%, 5%, and 10% level, respectively.

Table 3. Diff-in-Diff Estimation: U.S. Deficit Ratio with Individual Trading Partners

Panel A	Euro Zone	France	Germany	Ireland	Italy	Netherlands
Treated=1 (β_1)	-1.862†	-1.683†	-1.863†	-2.468‡	-1.445†	0.782
	(0.797)	(0.784)	(0.842)	(0.755)	(0.626)	(1.307)
Post=1 (β_2)	-0.107†	-0.168‡	0.013	-0.006	-0.050	-0.098
	(0.043)	(0.051)	(0.036)	(0.085)	(0.040)	(0.066)
Treated=1 * Post=1 (β_3)	**0.093‡**	**0.124‡**	0.008	**0.092‡**	0.037	**0.185‡**
	(0.022)	(0.028)	(0.023)	(0.027)	(0.025)	(0.045)
ipratio (β_4)	0.010	0.343	0.744‡	0.338‡	-0.062	0.616
	(0.073)	(0.256)	(0.237)	(0.085)	(0.152)	(0.499)
rfxr (β_5)	0.247†	0.220†	0.231†	0.278‡	0.165*	-0.053
	(0.108)	(0.106)	(0.114)	(0.102)	(0.085)	(0.178)
Country FEs	Yes	No	No	No	No	No
Time FEs	Yes	Yes	Yes	Yes	Yes	Yes
Observations	696	232	232	232	232	232

Panel B	Non-Euro Zone	Brazil	China	Japan	India	Taiwan	UK
Treated=1 (β_1)	0.147	-1.524‡	-1.297‡	-0.334	-0.930†	0.801†	-1.639†
	(0.215)	(0.560)	(0.223)	(0.277)	(0.361)	(0.313)	(0.808)
Post=1 (β_2)	-0.047	-0.190†	-0.095‡	-0.080†	-0.019	-0.040	-0.121†
	(0.030)	(0.078)	(0.030)	(0.040)	(0.037)	(0.035)	(0.050)
Treated=1 * Post=1 (β_3)	**0.075‡**	**0.170‡**	**0.091‡**	**0.068†**	**0.081‡**	**0.058‡**	**0.076†**
	(0.015)	(0.037)	(0.016)	(0.033)	(0.030)	(0.018)	(0.031)
ipratio (β_4)	0.170*	0.020	-0.006	-0.228	1.123‡	-0.083	-0.253
	(0.094)	(0.198)	(0.152)	(0.392)	(0.235)	(0.193)	(0.263)
rfxr (β_5)	0.017	0.286‡	0.161‡	0.056	0.253†	-0.239‡	0.237†
	(0.036)	(0.091)	(0.042)	(0.106)	(0.119)	(0.089)	(0.108)
Country FEs	Yes	No	No	No	No	No	No
Time FEs	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	812	232	232	232	232	232	232

Note: Newey-West HAC standard errors are in parenthesis. Superscript ‡, †, and * denote a statistical significance at the 1%, 5%, and 10% level, respectively.