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The Impact of Exports to China on Latin American Growth

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Abstract

This article analyzes the relationship between GDP growth in seven major Latin American countries and China's demand for their exports. GLS panel estimation using annual data for the period 1994-2013 shows that the relationship was both statistically and economically significant. Control variables found to be significant in positively affecting GDP growth include the investment-to-output ratio, the exchange rate, and the terms of trade, and, in negatively affecting it, population growth and the unemployment rate. Consistent with recent literature, foreign direct investment was found not to be significant. A sharp drop in exports to China for many of the countries in the sample in 2015 raises questions about the region's vulnerability to China's growth slowdown.

Keywords: Trade policy; Export-led growth; Foreign Direct Investment; Exchange Rate

JEL Classification: F14; F43; F21; F31

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Introduction

After a decade of strong growth in Latin America's exports to China, observers have been quick to tie the recent decline in the region's performance to weakening demand by China. Slower growth in China has been branded the "new normal" by President Xi Jinping.¹ After years at double-digit levels, China's GDP growth fell to 9.3% in 2011 (Figure 1). Confirming the declining trend, Premier Wen Jiabao in March 2012 set a growth target of 7.5%, a level that was re-affirmed in March 2014 by Premier Li Keqiang in his speech at the annual meeting of the legislature in Beijing (Bloomberg News, 2014).

Latin American economies have been hit since the global crisis in 2008 by a negative trade shock, falling commodity prices, an increase in currency valuations, and a decline in foreign direct investment inflows. Strong growth in exports to China stood as a bright spot, at least until 2015. By that year, Argentina was suffering double-digit inflation while Brazil's growth forecast was barely positive, down from 7.5% in 2010. In Chile, investor confidence was shaken by reform of the corporate tax system. Peru had experienced reduced export revenues due to falling commodity prices that led to a contraction in mining output. Venezuela ended 2014 with an inflation rate of 64% accompanied by shortages in food and medicine. Mexico overhauled its energy and telecommunications sectors in 2014, ending the year with better prospects than in the previous year when it grew by just 1.1%. By these standards, Colombia was faring relatively well with growth prospects above 4%.

Figure 1: GDP annual growth rates, in percent per annum

¹ Blázquez-Lidoy, Rodríguez and Santiso (2006) comment that the growing impact of China on Latin America has garnered the interest of major institutions, such as the Inter-American Development Bank (IDB) which has stepped up the number of studies into the impact of Chinese growth on Latin America. Chen and Chen (2013) argue that potentially slower Chinese growth will result in a reduction in Latin America's export growth. The World Bank (2014) showed that a 1-percentage point deceleration in Chinese growth has been associated with a 0.6 percentage point slowing of growth in Latin America and the Caribbean. In contrast, Garcia-Herrero, Ferchen and Nigrinis (2013) claim that Latin American GDP growth is minimally exposed to export dependence on China.

Source: World Bank (2015).

This paper examines the impact on Latin American GDP growth of China's demand for the region's exports. The analysis is based on a Solow–Swan growth model supported by robustness tests to address endogeneity and causality issues.

The paper proceeds as follows: Section 2 outlines the previous literature; Section 3 describes the data and methodology; Section 4 reports the results; Section 5 summarizes the robustness tests for endogeneity; and finally, Section 6 presents conclusions.

1. Previous literature

In the first decade of the twenty-first century, China's rapid growth and robust foreign direct investment (FDI) inflows impressed the world. Indeed, China's emergence was the topic of the decade, according to Wall Street analysts (Blázquez-Lidoy, Rodríguez, and Santiso, 2006). Yet despite China's attraction of global FDI, Chantasasawat, Fung, Iizaka, and Siu (2004) presented evidence that FDI to Latin America was little affected. And Dominguez (2006) argued that in the 2000s, Latin American countries became more important than ever for China, which in turn had become important for Latin American countries. On the other hand, García-Herrero and Santabábara (2007) found a significant negative impact of Chinese inward FDI on that received by Mexico until 2001 and on that received by Colombia after that date.

Exports to China are potentially important to Latin American growth, as evidenced in an article by Hausmann, Hwang, and Rodrik (2007) that shows that what a country exports matters. They constructed an export index designed to predicts a country's economic growth. Moreover,

Gallagher and Porzecanski (2008) argued that China accounts for a significant amount of the boost in Latin American exports and foreign investment in recent years, and that Latin America, with the exception of Mexico, is not significantly threatened by Chinese exports in global markets. Accordingly, Hsiang (2009) affirmed that China's purchase of regional commodities was the main factor in Latin America's economic growth in the preceding decade.

At the end of the 2000s decade, researchers explored the possibilities for China's economic future. Kharas (2011) argued that an active policy to promote the middle class in China was desirable and should be complementary to the ongoing efforts to combat poverty in order to avoid the risk that structural pressures would constrain China's growth. The rise of China's consumer class offers opportunities for brands looking for new revenue streams, but, at the same time, the consumer demand for more cars, air conditioners, and larger homes will put pressure on commodity markets and add to global tension (Rein and Roy, 2012).

What none of these papers foresaw was that the financial markets would again be hit, this time by the crisis with the euro, which had its first symptom with the Greek debt crisis of 2009 and later spread throughout Europe with global spillovers. Yu (2011) analyzed mining commodity prices, China's economic growth, and their implications for Latin America, and concluded that world demand was nevertheless likely to remain strong, reflecting the recovery of the global economy. Likewise, according to Ryczkowski (2012), China's continued engagement diminished the prestige of the United States in Latin America and, he suggested that if the United States desired a role in shaping the future of the Americas, it would be necessary for it to change its engagement policy with Brazil.

After the deepening of international financial troubles in 2011, the literature on China's economy shifted focus to the country's economic slowdown and its spillover effects on trading partners. For instance, Cai and Lu (2013) showed that an increase in labor force participation and improvement in total factor productivity could significantly enhance potential GDP growth, while Eichengreen, Park, and Shin (2012) provided evidence that an exceptionally low consumption share of GDP was associated with the probability of a slowdown. Both hopes and anxieties tied to Latin America's decade-long boom in economic relations with China are likely to persist, as commodities will continue to support the relationship even though, as García-Herrero, Ferchen, and Nigrinis (2013) have argued, Chinese demand for commodities may only

be responsible for a small contribution to GDP growth in those countries. Chen and Chen (2013) showed that potentially slower growth in China would weaken the country's demand for commodities from Latin America but that at the same time slower export growth would reduce the region's vulnerability to export price volatility.

China's slowdown may not, after all, have been an unpredictable course of events. Ianchovichina, Hertel, and Walmsley (2014) argued that the question has never been whether there would be a cooling off in China's growth as wages rose and expected rates of return to investments fell, but when this would happen and with what consequences. Using a sample of 64 economies, Ahuja and Nabar (2012) showed that an investment slowdown in China could generate large spillover effects on the country's trading partners. They found that every one percentage point deceleration in China's investment growth would subtract one-half to nine-tenths of a percentage point from GDP growth in Taiwan, Korea, and Malaysia, and that major commodity producers with relatively large exposures to China such as Chile and Saudi Arabia would also suffer substantial growth declines.

2. Data and Methodology

This study undertook panel data regressions using yearly data from 1994 to 2013 to estimate the relationship between Latin American GDP growth and exports to China. The sample consisted of seven Latin American countries: Argentina, Brazil, Chile, Colombia, Mexico, Peru, and Venezuela. These countries accounted for roughly 90% of Latin American exports in 2015, which totaled US\$ 899 billion according to the Inter-American Development Bank. A random-effects GLS regression model was adopted as supported by a Hausman test.²

Data sources were as follows: the World Economic Outlook (WEO) of the International Monetary Fund (IMF) for GDP growth and export data; World Development Indicators from the World Bank for data on FDI, unemployment rates, and terms of trade; Bank for International Settlements (BIS) for real-effective exchange rates; and the United Nations Comtrade for exports to China.

The estimating equation was derived from the Solow–Swan growth model:

² A Hausman (1978) test showed that we could not reject the null hypothesis that the coefficients are not systematically different for both random- and fixed-effects methods. We therefore used a random effects specification.

$$\Delta \ln(GDP)_{it} = \beta_{0t} + \beta_{1t} n_{it} + \beta_{2t} \Delta s_{it} + \beta_{3t} \Delta \ln(EXPORT)_{it} + \beta_{4t} \Delta \ln(REER)_{it} \\ + \beta_{5t} \Delta \ln(FDI)_{it} + \beta_{6t} \Delta (UNEMP)_{it} + \beta_{7t} \Delta \ln(TERMS)_{it}$$

where GDP is expressed in constant national currency units; n_{it} is population growth in percent per annum; s_{it} is the investment-to-output ratio; EXPORT is alternatively (due to the obvious endogeneity between exports to China and total exports) EXP representing total export volume, in quantities of goods (1994=100) or EXPCH representing exports to China in US\$ billion; REER is the real effective exchange rate based on the broad basket composition comprising 61 countries (2010 = 100) with an increase indicating appreciation; FDI is taken as net inflows in US\$ billion; UNEMP is the unemployment rate as a percentage of the total labor force; and TERMS is the terms of trade net barter index (ratio of export prices to import prices; 2000=100).

Most variables are log transformed with the exception of the unemployment rate, population growth rate, and investment-to-output ratio. The coefficients are thus interpreted as elasticities. As described by Martinez-Zarzoso (2013), the use of a log–log model is also suited to handling dependent variables that are skewed to the right as is the case in this context. First differencing was applied to all variables (with the exception of the population growth rate) after panel-data unit root tests showed that the level variables were not stationary.

The main hypotheses are: 1) exports to China have a significant effect on the growth of Latin American economies; and 2) GDP is positively correlated with exports, exchange rates, FDI, and terms of trade, and negatively correlated with the unemployment rate.

The unit root tests presented in Table 1 indicate that all variables are stationary.

Table 1: Unit Root Tests

Variables	ADF^{**}	IPS^{**}
	Test Statistics ^{***}	Test Statistics ^{***}
$\Delta \ln(GDP)_t$	−7.0988	−4.7736

n_t	-7.0137	-2.5800
Δs_t	-10.3178	-6.0530
$\Delta \ln(EXP)_t$	-6.9982	-4.7201
$\Delta \ln(EXPCH)_t$	-8.8457	-5.5811
$\Delta \ln(REER)_t$	-9.2654	-5.6564
$\Delta \ln(FDI)_t$	-10.3839	-6.0300
$\Delta UNEMP_t$	-9.5463	-5.7598
$\Delta \ln(TERMS)_t$	-9.1330	-5.6591

Notes:

* *ADF* test: Panel-data Fisher-type (Choi 2001) unit-root test based on augmented Dickey-Fuller tests, reporting the Z (inverse normal) statistics.

** *IPS* test: Im-Pesaran-Shin (2003) unit-root test, Z-t-tilde-bar statistic with critical values of -2.33 (1% level), -2.09 (5% level) and -1.96 (10% level).

*** significant to the 1% level.

Table 2 shows summary statistics for all variables by country.

Table 2: Summary Statistics

Variable	Argentina	Brazil	Chile	Colombia	Mexico	Peru	Venezuela
GDP (constant prices, million national currency units)	611	894	78,585	345,377	10,803	284	47
Population growth (% per annum)	1.1	1.3	1.2	1.3	1.5	1.4	1.8

Investment-to-output ratio (%)	18.1	19.3	23.5	20.9	21.6	21.3	23.8
Exports quantities (1994 = 100)	193.2	191.3	202.4	134.9	234.8	195.8	108.3
Exports to China (US\$ billion)	3.53	17.4	7.1	0.8	3.3	2.9	3.3
Real effective exchange rate (2010 = 100)	164.0	80.9	99.0	86.5	104.0	99.0	106.4
Foreign Direct Investment (US\$ billion)	7.6	32.1	9.8	6.2	20.6	4.2	2.8
Unemployment rate (% of labor force)	12.3	8.0	7.8	12.8	4.0	5.0	10.8

Figure 2 shows GDP increases from 1994 to 2013 for the seven sample countries. The strongest growth performer was Peru with an increase of 155.5%, with Chile close behind at 134.6%. At the opposite end of the spectrum, Mexico grew by 57.6%.

Figure 2: Gross Domestic Product of Latin American countries, 1994-2013

Source: World Bank (2015).

Exports to China from 1994 to 2015 are graphed in Figure 3 with supporting data presented in Table 3. The three panels of the figure are scaled differently to accommodate disparity in magnitudes across countries. Figure 3A shows total exports to China for the seven sample countries rose from US\$2.9 billion in 1994 to a peak of US\$121.5 in 2013 before dropping to US\$101.3 billion in 2015. For the first decade, 1994–2004, gains were modest, with the next decade then showing an increase of ten fold despite a dip in 2009.

Brazil accounted for nearly half the total, as shown in Figure 3B, its exports reaching US\$46.5 billion in 2015. Chile was next with US\$ 19.2 billion. Exports for the remaining sample countries are given in Figure 3C, with Mexico at US\$10.8 billion in 2015, Peru at US\$8.3 billion, Venezuela at US\$6.3 billion, Argentina at US\$6.0 billion, and Colombia at US\$3.6 billion.

A drop in exports in 2015 was manifest for all but Peru and Argentina. For Venezuela, the fall off began in 2013 with a cumulative loss of 52.6% by 2015. For Brazil, the decline began in 2014 with a two-year loss of 18.5% by 2015.

Figure 3: Exports to China by country, 1994-2013, in US\$ billion

Source: United Nations Comtrade database (2016).

Table 3: Exports to China, in US\$ billion

Year	Argentina	Brazil	Chile	Colombia	Mexico	Peru	Venezuela	Total
1994	0.46	1.51	0.25	0.02	0.19	0.42	0.03	2.88
1995	0.67	1.65	0.34	0.05	0.41	0.49	0.03	3.64
1996	0.77	2.00	0.61	0.02	0.52	0.56	0.04	4.53
1997	1.02	2.17	0.73	0.02	0.35	0.68	0.05	5.02
1998	0.94	1.69	0.68	0.02	0.36	0.33	0.02	4.03
1999	0.76	1.43	0.79	0.03	0.36	0.32	0.04	3.73
2000	1.08	2.20	1.48	0.05	0.73	0.58	0.11	6.23
2001	1.46	2.91	1.44	0.04	1.05	0.52	0.16	7.57
2002	1.41	3.64	1.72	0.04	1.34	0.76	0.16	9.07
2003	2.91	6.60	2.42	0.08	1.86	0.80	0.56	15.22
2004	3.48	9.56	3.86	0.19	2.31	1.56	0.75	21.71
2005	4.02	10.92	5.16	0.22	2.44	2.33	1.25	26.34
2006	3.92	14.00	5.91	0.28	2.87	2.95	2.65	32.58
2007	6.60	19.78	10.45	1.12	3.57	4.39	3.16	49.07
2008	9.63	31.71	11.39	1.16	4.08	4.55	6.72	69.23
2009	4.59	30.24	13.28	1.00	4.27	4.38	4.54	62.29
2010	7.12	39.90	18.32	2.14	7.37	6.44	6.75	88.04

2011	6.58	54.51	20.99	2.43	9.95	7.96	11.76	114.18
2012	6.87	54.64	21.09	3.19	9.94	8.55	14.57	118.85
2013	6.41	57.04	21.17	3.68	10.96	8.50	13.14	120.89
2014	5.60	54.96	21.57	7.64	12.09	8.32	11.34	121.52
2015	5.98	46.48	19.20	3.57	10.82	8.35	6.90	101.30
Total	82.83	451.33	183.62	27.04	88.16	74.32	84.76	992.06

Source: United Nations Comtrade database (2016).

A full accounting of the impact on Latin American economic performance of the recent decline in exports to China must await the reporting of more data. This study focuses on the period of export growth with only an intimation that if booming exports to China has had a positive impact on the region's growth, a reversal will likely have the opposite effect.

3. Regression Analysis

Table 4 displays panel-data regression results and generalized method of moments (GMM) robustness tests. Table 5 extends the analysis to two-stage least squares (2SLS) regressions that aim to show robustness for the Table 4 results by comparing the effects on Latin American growth of oil exports world wide and to China specifically.

In Table 4, the panel data random-effects GLS regression results of Models 1 to 4 show significant effects on GDP for total exports, exports to China, the real effective exchange rate, the unemployment rate, and the terms of trade. Models 1 and 2 differ in the incorporation of total exports versus exports to China. Given the insignificance of the FDI term in both these models (consistent with Chantasawat et al. (2004) and Jenkins et al. (2008)), this variable is dropped from Models 3 and 4 without loss of explanatory power. All independent variables were positively related to GDP, except for population growth and the unemployment rate, which were negatively related, consistent with expectations under the Solow–Swan growth model. An increase in the population growth rate implies that more output must be used to equip new

workers with capital, leaving less output for consumption or to increase capital per worker (Cabral and Mollick, 2012).

In Models 1 and 3, a 1% increase in total exports is associated with a 0.148% increase in GDP regardless of whether FDI is included in the regression. In Models 2 and 4, a 1% increase in exports to China is associated with a 0.019% increase in GDP, again regardless of FDI inclusion. This result is especially important given the phenomenal growth of Latin America's exports to China. For the last 10 years of the sample period, the seven countries under study saw a combined increase in exports to China of 284% for an implied increase in regional GDP of 5.4%. Applying the estimated elasticity estimate on a country by country basis, the contribution to 10-year GDP growth was: Argentina, +0.93%; Brazil, +6.2%; Chile, +5.2%; Colombia, +28.9%; Mexico, +6.5%; Peru, +4.9%; and Venezuela, +8.6%. Conversely, the 16.6% decline in regional exports to China that occurred in 2015 would imply a slowdown in GDP growth of 0.3% under the estimated elasticity relationship.

Table 4: Panel Data – GLS and GMM regressions

This table reports results for the panel-data random-effect GLS and GMM regressions using Arellano–Bond and Arellano–Bover/Blundell–Bond estimations. Data are yearly from 1994 to 2013. Figures in parentheses for the within regressions are White heteroscedasticity-consistent estimates of the asymptotic standard errors, $N \rightarrow \infty$. GMM standard errors are in parentheses. Superscripts ***, **, and * indicate significance at 0.01, 0.05, and 0.10 levels respectively.

Dependent variable: $\Delta \ln(\text{GDP}_{i,t})$												
Estimation: VARIABLES	Within GLS panel-data				Arellano-Bond (Difference GMM) dynamic panel				Arellano-Bover/Blundell-Bond (System GMM) dynamic panel			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
$\Delta \ln(\text{GDP}_{i,t-1})$	0.174*** (0.035)	0.137*** (0.042)	0.174*** (0.034)	0.137*** (0.042)	0.145*** (0.047)	0.110* (0.059)	0.145*** (0.046)	0.111* (0.059)	0.153*** (0.034)	0.111** (0.044)	0.149*** (0.034)	0.115** (0.045)
$n_{i,t}$	-0.020*** (<0.01)	-0.018** (<0.01)	-0.020*** (<0.01)	-0.018** (<0.01)	-0.018 (0.011)	-0.003 (0.013)	-0.018 (0.011)	-0.003 (0.013)	-0.019*** (<0.01)	-0.015* (<0.01)	-0.015** (<0.01)	-0.010 (<0.01)
$\Delta s_{i,t}$	0.007*** (<0.001)	0.007*** (<0.001)	0.007*** (<0.001)	0.007*** (<0.001)	0.007*** (<0.001)	0.007*** (0.001)	0.007*** (<0.001)	0.007*** (0.001)	0.007*** (<0.001)	0.007*** (<0.001)	0.007*** (<0.001)	0.007** (<0.001)
$\Delta \ln(\text{EXP}_{i,t})$	0.148*** (0.024)		0.148*** (0.024)		0.140*** (0.030)		0.140*** (0.030)		0.145*** (0.020)		0.135*** (0.021)	
$\Delta \ln(\text{EXPCH}_{i,t})$		0.019*** (0.004)		0.019*** (0.005)		0.020*** (0.007)		0.020*** (0.007)		0.021*** (0.005)		0.022** (0.005)
$\Delta \ln(\text{REER}_{i,t})$	0.055 (0.034)	0.060 (0.040)	0.055 (0.034)	0.060 (0.040)	0.057*** (0.015)	0.062*** (0.019)	0.057*** (0.015)	0.062*** (0.019)	0.059*** (0.011)	0.061*** (0.014)	0.062*** (0.011)	0.066** (0.015)
$\Delta \ln(\text{FDI}_{i,t})$	-4×10^{-4} (0.002)	10^{-4} (0.004)			-3×10^{-4} (0.003)	10^{-4} (0.004)			-0.001 (0.002)	-0.001 (0.003)		
$\Delta \ln(\text{UNEMP}_{i,t})$	-0.007** (0.003)	-0.010*** (0.003)	-0.007*** (0.003)	-0.010*** (0.003)	-0.008*** (0.002)	-0.011*** (0.002)	-0.008*** (0.002)	-0.011*** (0.002)	-0.008*** (0.001)	-0.012*** (0.002)	-0.008*** (0.001)	- (0.002)
$\Delta \ln(\text{TERMS}_{i,t})$	0.097*** (0.014)		0.097*** (0.014)		0.095*** (0.018)		0.095*** (0.018)		0.098*** (0.012)		0.098*** (0.013)	
Constant	0.044*** (0.007)	0.047*** (0.011)	0.044*** (0.007)	0.047*** (0.011)	0.044*** (0.015)	0.027 (0.018)	0.044*** (0.015)	0.027 (0.018)	0.044*** (<0.01)	0.043*** (0.011)	0.040*** (<0.01)	0.037** (0.012)
Sargan (p-value)					0.3089	0.7411	0.3130	0.7226	0.1449	0.5669	0.2449	0.6862

[illegible]

4. Robustness tests

Tables 4 and 5 present results of robustness tests for endogeneity. Table 4 provides GMM dynamic panel regressions results. Models 5 to 8 involve Arellano–Bond (Difference GMM) dynamic panel regressions and models 9 to 12 Arellano–Bover/Blundell–Bond (System GMM) dynamic panel regressions.

By relaxing the assumption of exogeneity for the GLS models, the GMM estimations yield coefficient estimates of similar magnitude but with different standard errors and hence different significance test results. For instance, the lagged GDP variable is significant at the 10% level in the Difference GMM estimations and at the 5% level in the System GMM estimations when the model incorporates exports to China. This may be related to the gain in significance of the real effective exchange rate variable, which becomes highly significant (to the 1% level) under both GMM estimations. As under the within GLS estimations, the FDI coefficient estimate did not register as significant under the dynamic panel estimations.

Table 5 shows estimation results for two-stage least squares (2SLS) regressions aiming not only to confirm a significant relationship between Chinese demand for exports and Latin American GDP growth, but also to verify the direction of the causality as running from exports to GDP and not vice versa.

The export variable takes on four different export measures in Models 13 to 16 as follows: Model 13, EXP is total export volume, in quantities of goods, indexed such that 1994 = 100; Model 14, EXPCH is exports to China, in US\$ billions; Model 15, OILW is exports of crude oil to the world, in US\$ billions; and Model 16, OILCH is exports of crude oil to China, in US\$ billions. The change in the natural log of the export variable functions as the dependent variable in the first stage of the four regressions and one of the independent variables in the second stage.

Both EXP in Model 13 and EXPCH in Model 14 yield significant coefficient estimates, confirming that both total exports and exports to China were significant contributors to Latin America GDP growth during the period under study. The last two models run an additional robustness check to identify the effects of crude oil exports to the world and to China. The coefficient estimates of 0.063 and 0.025, respectively, are significant at the 10% level, while all control variables in the second stage of these two models are significant as well.

Finally, there is no clear evidence of a single-direction causal relationship among Latin American GDP and the variables in Model 15, which considers Latin America's total exports to

the world. However, the subsequent three regressions which involve all exports to China and oil exports both to the world and to China, had a causal effect on Latin American GDP.

Table 5: Instrumental Variables 2-Stage Least Squares

This table reports 2SLS estimation results. Data are yearly from 1994 to 2013. No data are available for oil exports from Chile to China. Standard errors are shown in parentheses. Superscripts ***, **, and * denote 0.01, 0.05, and 0.10 levels of significance, respectively.

	$\Delta \ln (\text{EXP}_{i,t})$		$\Delta \ln (\text{EXPCH}_{i,t})$		$\Delta \ln (\text{OILW}_{i,t})$		$\Delta \ln (\text{OILCH}_{i,t})$	
	(13)		(14)		(15)		(16)	
Indep. variables	Dep. variable: $\Delta \ln$ ($\text{GDP}_{i,t}$)	(First Stage) Dep. variable: $\Delta \ln$ ($\text{EXP}_{i,t}$)	Dep. variable: $\Delta \ln$ ($\text{GDP}_{i,t}$)	(First Stage) Dep. variable: $\Delta \ln$ ($\text{EXPCH}_{i,t}$)	Dep. variable: $\Delta \ln$ ($\text{GDP}_{i,t}$)	(First Stage) Dep. variable: $\Delta \ln$ ($\text{OILW}_{i,t}$)	Dep. variable: $\Delta \ln$ ($\text{GDP}_{i,t}$)	(First Stage) Dep. variable: $\Delta \ln$ ($\text{OILCH}_{i,t}$)
$n_{i,t}$	-0.029* (0.017)	0.029 (0.022)	-0.028*** (0.010)	0.020 (0.103)	-0.074* (0.042)	0.782 (0.588)	-0.040** (0.021)	0.880 (0.960)
$\Delta S_{i,t}$	0.006*** (0.002)	-0.001 (0.003)	0.010*** (0.001)	0.011 (0.015)	0.008* (0.004)	0.019 (0.092)	0.010*** (0.003)	0.028 (0.153)
$\Delta \ln (\text{EXPORTS}_{i,t})$	0.767*** (0.174)		0.057*** (0.015)		0.063* (0.034)		0.025* (0.013)	
$\Delta \ln (\text{GDP}_{i,t})$		1.183*** -0.259 (0.051)		0.401 (1.180)		6.710 (6.865)		2.679 (11.448)
$\Delta \ln (\text{REER}_{i,t})$		-0.104** (0.051)		-0.101 (0.234)		-0.217 (1.281)		3.015 2.101
$\Delta \ln (\text{FDI}_{i,t})$		0.006 (0.010)		-0.028 (0.046)		-0.176 (0.274)		0.052 (0.293)
$\Delta \ln (\text{UNEMP}_{i,t})$		0.013** (0.006)		0.023 (0.026)		0.107 (0.145)		-0.125 (0.221)
$\Delta \ln (\text{TERMS}_{i,t})$		-0.097 (0.061)		1.757*** (0.279)		1.562 (1.679)		0.934 (2.058)
Constant	0.041* (0.025)	-0.034 (0.034)	0.058*** (0.014)	0.136 (0.155)	0.115*** (0.055)	-1.035 (0.895)	0.075*** (0.023)	-0.769 (1.276)
R^2	79.3%	19.0%	36.9%	28.0%	4.8%	5.7%	55.0%	23.7%
Adj. R^2		14.4%		24.0%		0.8%		4.7%

5. Conclusions

This study analyzes the relationship between GDP growth in seven major Latin American economies and China's demand for Latin America's exports. Beginning with the global financial crisis in 2008, Latin American economies have been beset with reduced trade around the globe, falling prices of commodities, an increase in their currency values, and a decrease in net foreign direct investment inflows. Exports to China have been a bright spot in this otherwise disappointing picture.

This article confirms a causal relationship between China's demand for exports and Latin American GDP growth for the period 1994 to 2013. GLS panel data estimation for seven of the region's largest economies implies that a 1% increase in exports to China increased Latin American GDP by nearly 0.02%. Given very strong growth in the region's exports to China over the 2004-2013 decade, the cumulative impact was to increase GDP by an estimated 5.4%.

The conclusion is that exporting to China has presented an excellent opportunity for Latin America over a period of years during which Chinese demand grew rapidly. This is consistent with García-Herrero, Ferchen, and Nigrinis (2013)³.

Latin American GDP growth was further found to be positively related to the investment-to-output ratio, total exports, the real effective exchange rates and the terms of trade and negatively related to population growth and the unemployment rate. The relationship between FDI and GDP growth was found to be insignificant.

In light of the slowdown in China's growth in more recent years and the pursuant contraction in exports to China for some Latin American countries – a contraction which was particularly sharp and widespread in 2015 – the question as to how vulnerable Latin America has become to changing conditions in China has naturally been raised. The degree to which reversals in exports to China may have had an impact on Latin American GDP is a subject that must be left to future research.

³ Even though the result is in line with these authors, they do not use econometric tests to reach this conclusion. Instead, they measure dependency of Latin America on China with a "China export dependency index" by country which is equal to the geometric mean of three components: commodity concentration of exports; exports of commodities to China divided by total commodity exports; and the average of the share of China's imports of commodities in the global market and 1 minus its share of exports.

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