

# Does State Export Granger-Cause State GDP?

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# Abstract

- We study the relationship between export growth and net GDP growth for the 50 states over the last decade where net GDP is defined as GDP net of exports. This study focuses on whether state export growth Granger-causes state net GDP growth. We perform the F-test of overall significance of both net GDPg (3 lags) and Xg (3 lags) at 5% significance level. Our results do not show supporting evidence that state export growth Granger-causes GDP growth.

# Theory

- Heckscher-Ohlin (H-O) theory
- The export-base theory

$$GDPg_{it} = f (GDPg_{it-1} \dots GDPg_{it-p}, Xg_{it-1} \dots Xg_{it-p}, CPIg_{it-1} \dots CPIg_{it-p}, RWGDPg_{it-1} \dots RWGDPg_{it-p})$$

$$Xg_{it} = f (GDPg_{it-1} \dots GDPg_{it-p}, Xg_{it-1} \dots Xg_{it-p}, CPIg_{it-1} \dots CPIg_{it-p}, RWGDPg_{it-1} \dots RWGDPg_{it-p}) \quad (1)$$

- $GDPg_{it}$ : - GDP growth across the 50 states (1997-2010) **(2)**
- $Xg_{it}$ : - Export growth across the 50 states (1997-2010)
- $CPIg_{it}$ : - US Consumer Price Index (1997-2010)
- $RWGDPg_{it}$ : - Rest of the world GDP growth (1997-2010)

# Econometric equation and variables

$$\begin{aligned} \text{GDPG}_{it} = & \beta_1 + \beta_2 * \text{GDPG}_{it}(-1) + \beta_3 * \text{GDPG}_{it}(-2) + \\ & \beta_4 * \text{GDPG}_{it}(-3) + \beta_5 * \text{XG}_{it}(-1) + \beta_6 * \text{XG}_{it}(-2) + \beta_7 * \text{XG}_{it} \\ & (-3) + \beta_8 * \text{CPIG}_{it}(-1) + \beta_9 * \text{CPIG}_{it}(-2) + \beta_{10} * \text{CPIG}_{it}(-3) + \\ & \beta_{11} * \text{RWGDPG}_{it}(-1) + \beta_{12} * \text{RWGDPG}_{it}(-2) + \\ & \beta_{13} * \text{RWGDPG}_{it}(-3) + (\beta X=F) + \varepsilon_{it} \end{aligned} \quad (3)$$

$$\begin{aligned} \text{XG}_{it} = & \beta_1 + \beta_2 * \text{GDPG}_{it}(-1) + \beta_3 * \text{GDPG}_{it}(-2) + \beta_4 * \text{GDPG}_{it} \\ & (-3) + \beta_5 * \text{XG}_{it}(-1) + \beta_6 * \text{XG}_{it}(-2) + \beta_7 * \text{XG}_{it}(-3) + \\ & \beta_8 * \text{CPIG}_{it}(-1) + \beta_9 * \text{CPIG}_{it}(-2) + \beta_{10} * \text{CPIG}_{it}(-3) + \\ & \beta_{11} * \text{RWGDPG}_{it}(-1) + \beta_{12} * \text{RWGDPG}_{it}(-2) + \\ & \beta_{13} * \text{RWGDPG}_{it}(-3) + (\beta X=F) + \varepsilon_{it} \end{aligned} \quad (4)$$

# Data

- Data needed to calculate variables in equations (1) and (2) for our sample of 50 states in the years 1997-2010 was obtained from WISERTrade, The World Bank, Bureau of Economic Analysis (BEA) and Bureau of Labor Statistics (BLS).
- We used growth rates because we wanted to reduce the absolute size of the numbers associated with the same actual meaning.

# Empirical Analysis

We believe that export growth and net GDP growth do not impact each other instantaneously, because it would take a few years for a change to be reflected on either export growth or net GDP growth.

Table 1

	<b>GDPg</b>		
	<b>1<sup>st</sup> lag</b>	<b>2<sup>nd</sup> lag</b>	<b>3<sup>rd</sup> lag</b>
<b>Adj.R<sup>2</sup></b>	0.248	0.299	0.563
<b>AK</b>	-4.374	-4.392	-4.824
<b>SC</b>	-3.978	-3.937	-4.300

Table 2

	<b>Xg</b>		
	<b>1<sup>st</sup> lag</b>	<b>2<sup>nd</sup> lag</b>	<b>3<sup>rd</sup> lag</b>
<b>Adj.R<sup>2</sup></b>	0.194	0.279	0.473
<b>AK</b>	-0.924	-1.007	-1.262
<b>SC</b>	-0.527	-0.551	-0.738

We see that the adjusted  $R^2$  peaked in the 3rd lag and also Akaike and Schwarz criteria are minimal in the 3rd lag for both equations.

# Results

<b>GDPg (Lagged 3 Years) -Wald Test</b>			
<b>Test Statistic</b>	<b>Value</b>	<b>df</b>	<b>Probability</b>
<b>F-statistic</b>	0.967	(3,436)	0.408
<b>Chi-square</b>	2.902	3	0.407

Since the p-value =  $0.408 > 0.05$ , we fail to reject the null hypothesis and conclude that export-growth does not cause net GDP-growth.

# Results

<b>Xg (Lagged 3 Years) -Wald Test</b>			
<b>Test Statistic</b>	<b>Value</b>	<b>df</b>	<b>Probability</b>
<b>F-statistic</b>	1.83	(3,436)	0.141
<b>Chi-square</b>	5.491	3	0.139

Since the p-value = 0.14 > 0.05, we fail to reject the null hypothesis and conclude that net GDP-growth does not cause export-growth.



## Policy Implications

- State foreign export promotion, a highly visible component of state economic development programs, is premised on the belief that growth of foreign exports will stimulate state level economic development.

## Policy Implications

- Our results pose some questions about the effectiveness of such policies. Since results show that export growth does not Granger-cause state GDP growth, economic development resources should not be directed to increasing exports as it does not result in economic growth.