Transportation Forecast for Southern California:

Linking a San Pedro Bay Forecast to Regional Labor Markets

Final Report

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ABSTRACT

Using time series forecasting techniques, we develop multiple forecasts of inbound container traffic through the San Pedro Bay Ports. These forecasts, combined with panel data labor market models, allow us to forecast the impact of declining freight volumes on total employment, transportation employment, and transportation payroll in Los Angeles and Orange Counties and the Inland Empire. We find that the decline in traffic is associated with a decline of nearly 330,000 jobs in 2009 and 147,000 jobs in 2010 in the 4-county region. Transportation employment is estimated to have declined by nearly 14,000 jobs in 2009 due to declining port activity and forecast to decline by another 5,000 in 2010.

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DISCLOSURE

This project was funded in entirety under this contract to California Department of Transportation.

1. INTRODUCTION

The volume of trade entering the U.S. through the Ports of Long Beach and Los Angeles (the San Pedro Bay ports) has risen considerably over the past two decades. The Ports are seen as engines of economic growth, as jobs related to goods movement have increased considerably in the Southern California region. This rise in trade-dependent jobs, concurrent with the decline in manufacturing employment, has led to increasing interest in facilitating goods movement in the region, through investment in public and private infrastructure.

The importance of goods movement to the region is typically measured quantitatively through input-output (I-O) modeling, which uses established multipliers to estimate the impacts of port activity on the local, regional, and national economy. For example, a 2007 study by BST Associates attributes 3 million jobs to port activity in 2005 (BST, 2007).

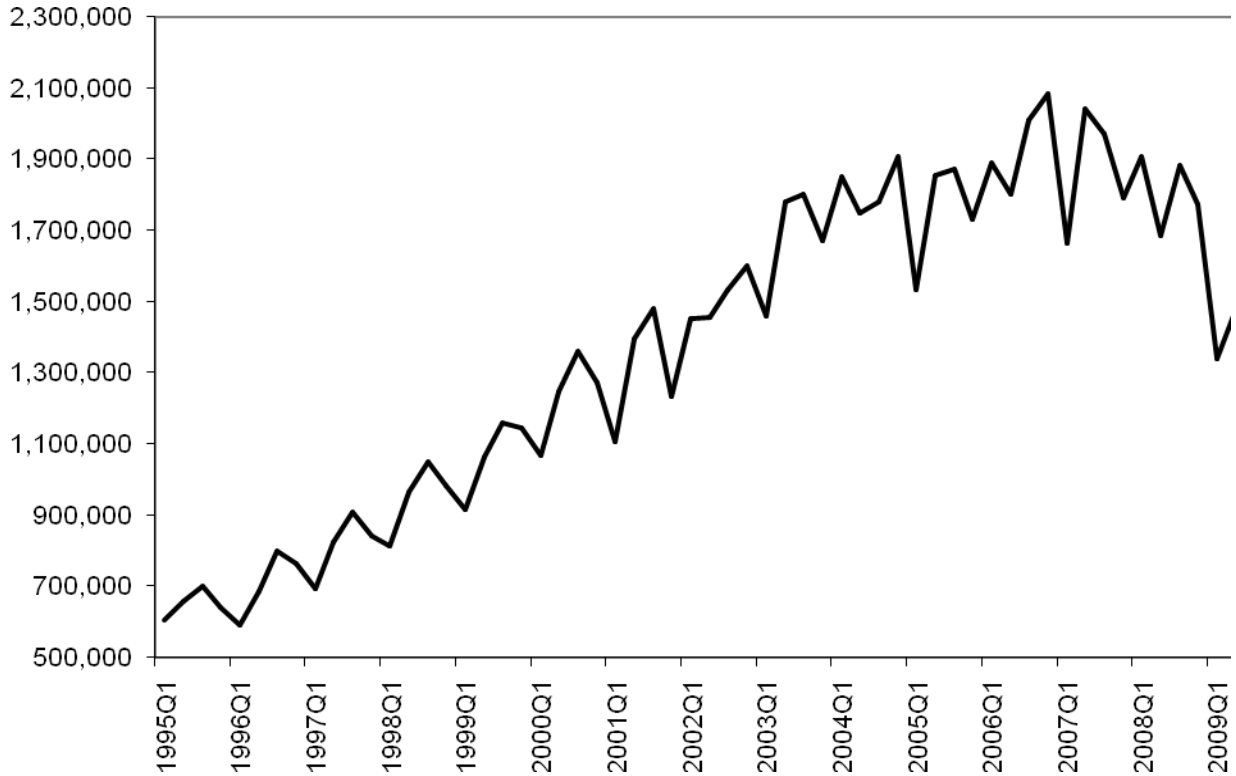
The limitations of I-O studies is that they use multipliers established in prior periods (which can be quite dated) and lack visible links of the channels by which port activity results in jobs. In this study we employ a different quantitative approach to linking port activity to the regional labor market. First, we develop and evaluate forecasts of inbound port traffic using three techniques of time series econometrics. Second, we use panel data estimation techniques to model local labor markets, to generate an estimate of the impact of changes in inbound container volumes on employment and payroll. Finally, we combine the forecast of port activity with the labor market estimation results to predict the short-term job market impacts of the decline in imports on the regional economy.

The advantage of this approach is that the data is readily available and the estimations provide results that clearly estimate the linkages between port activity and the regional labor market outcomes (as opposed to the "black box" approach of I-O models). These models are easily updated as more data becomes available and are easily replicated (all data and programs are available from the authors upon request).

2. TRENDS IN TRADE THROUGH THE SAN PEDRO BAY PORTS

The economic slowdown has caused substantial declines in U.S. imports. Figure 1 shows the trends in loaded inbound containers into the Ports of Los Angeles and Long Beach through the second quarter of 2009.

Figure 1: Trends in Loaded Inbound Containers at the San Pedro Bay Ports



While is clear from figure 1 that loaded imports (which generate the most economic activity in the region) decreased substantially at the end of 2007, it is not clear which imports were most affected and whether some of this decline may have been caused by diversion to other U.S. ports.

Using data from the U.S. Census we examine the changes in the largest imports (by weight and by value) by type of commodity (classified by harmonized tariff code). Tables 1 presents the 2008 weight of the top 15 import classifications through the Ports of Los Angeles and Long Beach, as well as the percentage change from 2006 to 2008, and the percentage change over the same period for imports into all U.S. ports. Table 2 presents the same data by value of imports (measured in 2008 dollars).

Table 1: Trends in Imports by HTC; Top 15 by Weight

Commodity	San Pedro Bay 2008 SWT Imports	Percentage Change (2006-2008)	US Percentage Change (2006-2008)
27 Mineral Fuel, Oil Etc.	19,356,645,954	-11.02%	-8.00%
84 Nuclear Reactors, Boilers, Machinery Etc.; Parts	4,368,019,988	-8.65%	-9.66%
94 Furniture; Bedding Etc;	3,996,629,057	-21.31%	-12.22%
85 Electric Machinery Etc;	3,858,134,008	-5.68%	-2.71%
73 Articles Of Iron Or Steel	3,384,478,722	-14.17%	10.40%
87 Vehicles, Except Railway Or Tramway, And Parts Etc	3,032,612,815	-8.91%	-11.91%
72 Iron And Steel	2,679,606,532	-39.88%	-42.25%
39 Plastics And Articles Thereof	2,476,092,713	-15.60%	-10.25%
95 Toys, Games & Sport Equipment;	1,876,229,693	-9.75%	-6.94%
68 Art Of Stone, Plaster, Cement, Asbestos, Mica Etc.	1,645,476,461	-8.49%	-17.38%
40 Rubber And Articles Thereof	1,635,684,953	-3.75%	-2.27%
25 Salt; Sulfur; Earth & Stone; Lime & Cement Plaster	1,392,029,787	-72.16%	-28.50%
48 Paper & Paperboard & Articles	1,314,180,426	-7.70%	-15.80%
69 Ceramic Products	1,219,027,178	-26.70%	-33.94%

44 Wood And Articles Of Wood	1,105,042,724	-32.99%	-50.73%

Table 2: Trends in Imports by HTC; Top 15 by Value

Commodity	San Pedro Bay Value of Imports, 2008	Percentage Change (2006-8)	US Percentage Change (2006-8)
85 Electric Machinery Etc;	$46,923,836,355	8.12%	11.04%
84 Nuclear Reactors, Boilers, Machinery Etc.;	$43,740,013,011	-11.84%	-4.42%
87 Vehicles And Parts Etc	$24,486,108,688	-17.03%	-12.01%
95 Toys, Games & Sport Equipment	$13,709,854,928	11.27%	23.90%
27 Mineral Fuel, Oil Etc.; Bitumin Subst; Mineral Wax	$13,140,865,790	23.20%	35.69%
61 Apparel Articles And Accessories, Knit Or Crochet	$12,903,616,878	12.17%	4.80%
94 Furniture; Bedding Etc; Lamps	$11,688,172,007	-16.58%	-7.79%
62 Apparel Articles And Accessories, Not Knit Etc.	$11,561,048,474	-6.90%	-7.52%
64 Footwear, Gaiters Etc. And Parts Thereof	$8,980,625,285	-4.19%	-3.40%
73 Articles Of Iron Or Steel	$7,526,858,174	7.77%	33.70%
39 Plastics And Articles Thereof	$7,318,969,640	-4.15%	1.29%
40 Rubber And Articles Thereof	$5,811,993,814	5.61%	12.78%
90 Optic, Photo Etc, Medic Or Surgical Instrments Etc	$4,725,283,931	7.75%	13.98%
42 Leather Art; Saddlery Etc; Handbags Etc; Gut Art	$4,050,243,382	-11.28%	1.01%
29 Organic Chemicals	$3,662,003,370	65.84%	24.81%

From Table 1 it is clear that the SPB ports saw a drop in total weight shipped for each of the top 15 import categories over the 2006-8 period. What is notable is that some commodities, such as articles of iron or steel, increased for the U.S. as a whole over the period, indicating that shipments were being diverted from the SPB ports to other U.S. ports. A similar trend is seen with iron and steel and salt, sulfur and stone, where the decline in volume through the SPB ports far exceeds the decline for all U.S. ports.

Trends in freight values shipped through the two ports allows a comparison of freight that incorporates both weight and price. Vehicles, a major high-value import for

the SPB ports, declined substantially between 2006 and 2008, mirrored in the declines for the US as a whole, indicating that most of the decline was due to economic reasons, not due to vehicles being imported through other U.S. ports. The value of toys, mineral fuel and oil, rubber, and apparel increased through the SPB ports, but increased more for the U.S. as a whole, suggesting diversion of this freight to other U.S. ports. The SPB ports did not lag behind US ports in all of the top commodities; the value of organic chemicals imported through SPB increased 66%, substantially higher than the increase in the U.S. as a whole. A similar trend is seen for knit apparel.

Given the substantial changes in imported goods over the 2006-8 period, it is clear that a forecast of imports would be a useful tool. The goal is to construct and evaluate a number of forecasts to determine if there is a model that can reliably forecast port traffic with a parsimonious specification, making it easy to update and replicate.

3. PORT FORECAST

3A. Models of Inbound Loaded Containers

To forecast quarterly[1] inbound container traffic to the San Pedro Bay Ports, we consider three different models. The first is developed from international trade theory, the second is correlation-based, and the third is a control model. The theory model generates forecasts of loaded inbound container traffic, while the correlation and control models generate forecasts of the percentage change in of loaded inbound container traffic.[2]

[1] We focus on quarterly projections, as opposed to monthly, primarily because of data availability.
[2] We use percentages (log changes) because of strong evidence that the loaded inbound series displays a unit root (as well as the GDP and exchange rate data). It is not necessary to correct for this in the VECM as this is accounted for in the estimation procedure.

The theory model is based on a standard imperfect substitutes trade model.[3] The model is given by:

(1) $imp_t = \beta_0 + \beta_1 y_t + \beta_2 r_t$

Where *imp* is real imports, *y* is real income, and *r* is the real value of the dollar. Of course, in our case we are interested in port activity (*in*), not imports, so we simply swap out *imp* for *in*. Additionally, we can convert this contemporaneous model to a predictive model by simply lagging the variables on the right-hand-side. Allowing there to be a long run relation between the levels of port activity, the value of the dollar (measured by the real effective exchange rate), and income results in the baseline model:

(2) $\Delta in_t = \beta_0 + \gamma_1 in_{t-1} + \gamma_2 y_{t-1} + \gamma_3 r_{t-1} + \beta_1 \Delta in_{t-1} + \beta_2 \Delta y_{t-1} + \beta_3 \Delta r_{t-1} + u_t$

This baseline model can be expanded by including additional lagged changes (we include two lags in our final model), or, more interestingly additional variables. Other potential important variables, in terms of forecasting, include U.S. real household net worth, changes in business inventories (motivated by the view that big import changes are associated with inventory investment or disinvestment due to just-in-time supply management), or U.S. credit standards (in an attempt to capture the effects of trade financing on imports). We tried various combinations of these variables, but in terms of performance measures such as information criteria, correlogram analysis, root mean square forecast error, etc, the baseline model performed best.

As an alternative, we also construct a model based on correlations. The goal with this model was to capture the correlations between world trade and port activity.

[3] For more information on imperfect substitutes trade models, see Krugman and Obstfeld (2008)

Specifically, we assume that the historical relationship between world trade and San Pedro Bay port traffic can predict future inbound traffic. The model is then:

(3) $in_t = \beta_0 + \beta_1 imp_t$

Where *in* is port activity and *imp* is actual and OECD forecasted U.S. imports. Other variables we considered (in addition and in isolation) included forecasts of U.S. real GDP, G8 imports, and G8 economic activity. As with the first model, however, the most parsimonious model proved best.

The final, control model, is a univariate model with no basis in economic theory. The model was constructed using Box-Jenkins-type methodology. The model is specified as follows:

(4) $in_t = \beta_0 + \beta_1 in_{t-1} + \beta_2 in_{t-2}$

The three forecast models are summarized below:[4]

Table 3: Forecast Models

Model Type	**Variables**	**Estimation Procedure**
Theory	Loaded inbound, US real exchange rate, US real GDP	Vector error correction (VEC)
Correlation	Percent change in loaded inbound, OECD forecast of US imports	Ordinary least squares (OLS)
Control	Percent change in loaded inbound	Ordinary least squares (OLS)

[4] All models also contain a constant, quarterly dummy variables, a 2002:4 dummy (lockout), and a 2004:3 dummy (congestion). All variables, with the exception of the dummy variables, are logged. Lag lengths are chosen using Schwartz Information Criterion.

The data begin in the first quarter of 1995 (1995:1) and run through the second quarter of 2009 (2009:2). Forecasts are generated through the second quarter of 2010. The data for the forecasting models are from several sources. Loaded inbound containers for the Ports of Los Angeles and Long Beach are obtained by the websites of the two ports, OECD forecasts are obtained from the *OECD Economic Outlook* No. 85, U.S. real GDP data is from the FRED® (Federal Reserve Economic Data) database (http://research.stlouisfed.org/fred2/), and the U.S. real effective exchange rate is from the Bank for International Settlements (http://www.bis.org/statistics/eer/index.htm)

3B. Evaluating the forecasts

The primary method of forecast evaluation within each of the three categories of models was pseudo-out-of-sample forecasting. The models were estimated using the 1995:1-2008:2 sample, with forecasts generated for 2008:3-2010:4. Using the actual realizations and comparing them to the forecasts we were able to calculate the root mean square forecast errors of the various models. As mentioned above, we supplemented this "out-of-sample" procedure with "in-sample" procedures such as comparison of information criteria and correlogram analysis (where appropriate). While the final models were estimated in both levels and first differences, the forecasts below are the results from the differenced models (which were more accurate) transformed into levels (to make the charts more accessible). The standard errors of the forecast are shown in dashed lines.

Figure 2: Theory Forecast

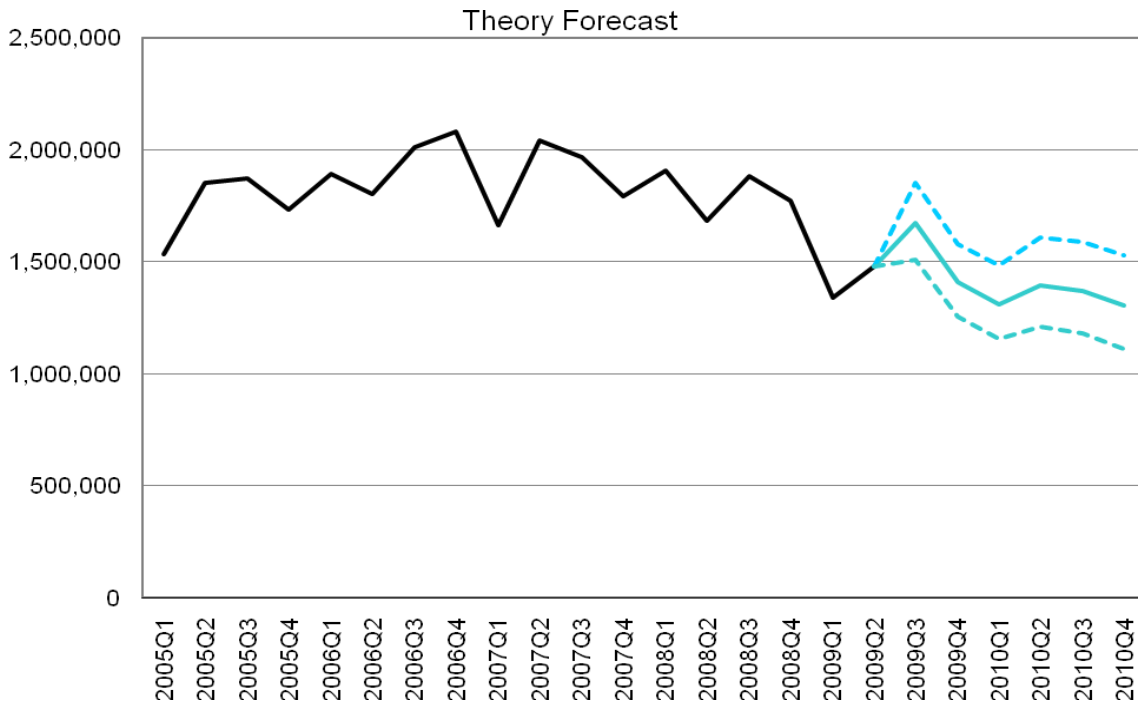


Figure 3: Correlation Forecast

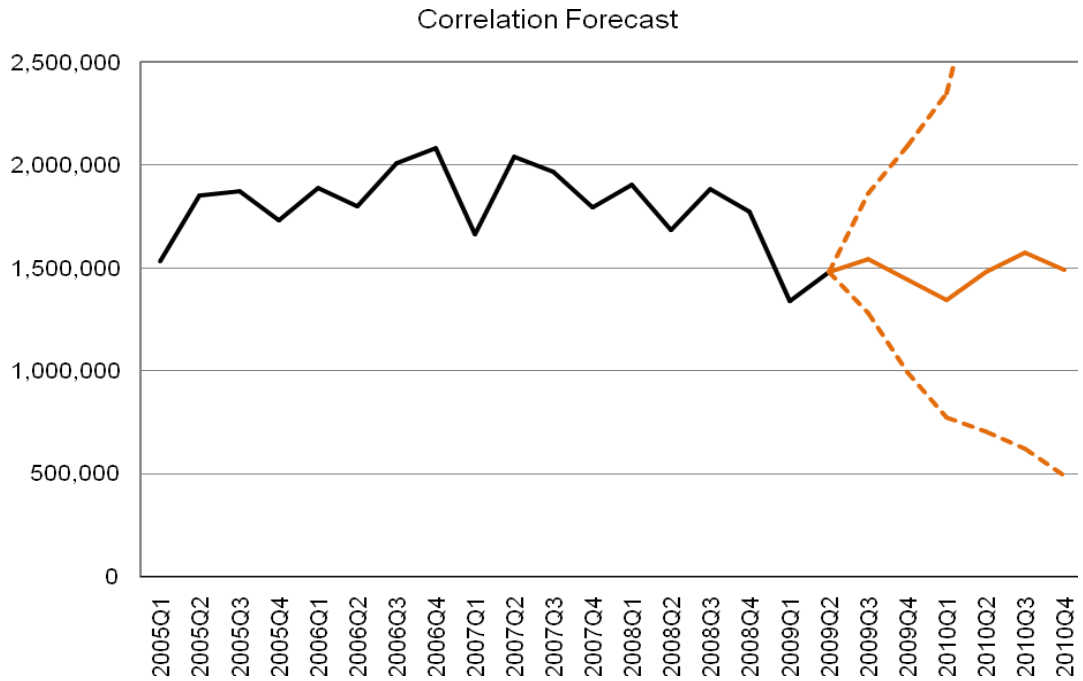
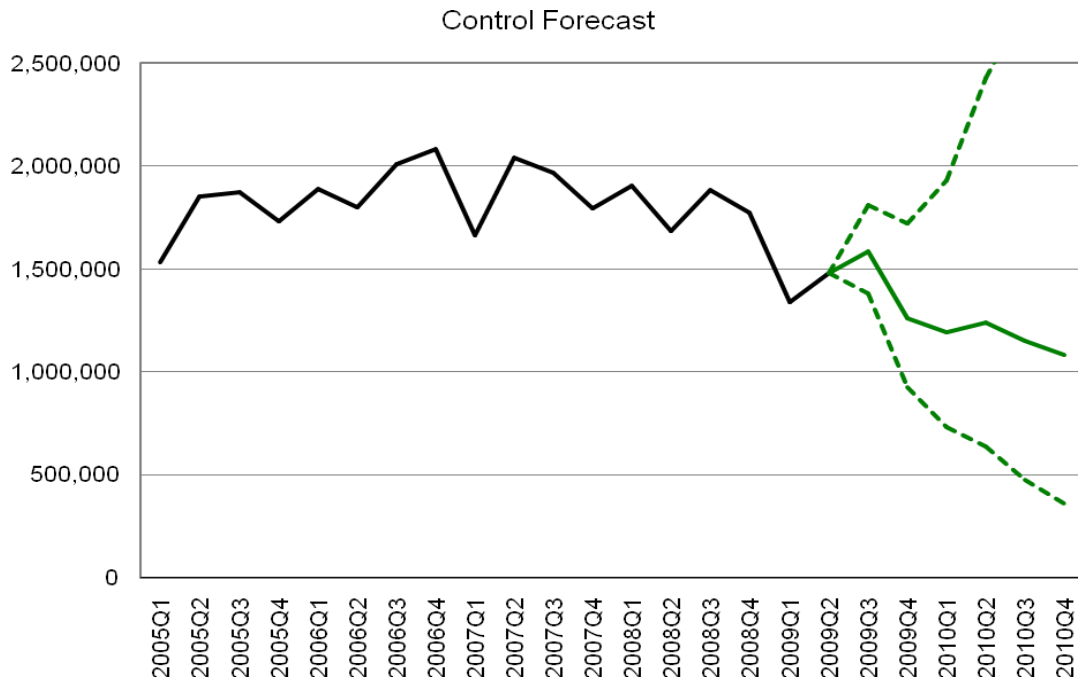


Figure 4: Control Forecast



Diagnostics for the three models are presented below.

Table 4: Forecast Model Diagnostics

Model Type	**Root Mean Squared Error**	**Adjusted R-squared**
Theory	0.1931	0.7262
Correlation	0.0948	0.4127
Control	0.2268	0.6991

Comparing across the three models, the Control/Box-Jenkins-type models seem to perform better in the pseudo-out-of-sample forecasting exercises. The argument can be made that they should perform better because they are parsimonious and simple (in terms

of estimation). On the other hand, the Theory/VECM *looks* to be more accurate when it comes to the 2009-10 forecasts.

Based on the RMSE, the correlation model appears to be the best estimator, followed by the theory model and the control model. The adjusted R-squared can only be used to compare the correlation and control models (as the theory model has a different dependent variable) and, contrary to the RMSE, implies the control model outperforms the correlation model.

Clearly, none of the models really predicted the severity of the fall in port activity in 2008. We do not find this surprising. No forecasting models that we are aware of matched the decline in imports over the past year. As the fall in traffic over the 2008-9 period was unprecedented in the data, it is difficult to accurately forecast such a decline. As more periods of increasing and decreasing activity will be evidenced in the coming years, a continued effort to generate quarterly forecasts should lead to more reliable forecasts in the future.

4. LINKING REGIONAL EMPLOYMENT TO INBOUND PORT TRAFFIC

Both Ports boast of the number of local and regional jobs linked to port activity. In this section, we use panel regression analysis to measure the link between loaded imports and regional employment, transportation employment, and transportation payroll. All data run from 1995-2008. The counties included are Los Angeles, Orange, and Riverside and San Bernardino. The latter two are combined into an Inland Empire designation due to some data limitations in gathering data on the two counties separately.

Trends in total employment, employment in the transportation industry, and transportation payroll are presented in Tables 5a-5c.

Table 5a: Trends in Employment and Payroll, Los Angeles County

year	Total Employment	Transportation Employment	Transportation Payroll (in millions)
1990	4,149,500	143,200	3873
1991	3,992,600	142,700	4197
1992	3,813,600	136,800	4342
1993	3,716,800	134,000	4357
1994	3,710,400	134,900	4477
1995	3,754,500	139,500	4646
1996	3,795,700	142,400	4763
1997	3,872,000	147,300	5190
1998	3,951,200	154,200	5455
1999	4,010,200	159,300	5763
2000	4,079,800	162,200	6259
2001	4,082,000	163,500	6369
2002	4,034,600	155,400	6233
2003	3,990,800	149,200	6140
2004	4,004,100	148,500	6271
2005	4,031,600	149,100	6385
2006	4,100,100	152,300	6788
2007	4,129,600	152,300	6951
2008	4,076,200	148,500	6764

Table 5b: Trends in Employment and Payroll, Orange County

year	Total Employment	Transportation Employment	Transportation Payroll (in millions)
1990	1,179,000	21,200	455
1991	1,150,800	23,000	459
1992	1,133,200	23,200	580
1993	1,122,700	24,700	581

1994	1,133,800	27,500	624
1995	1,158,000	27,800	673
1996	1,191,000	27,100	669
1997	1,240,700	27,100	715
1998	1,305,700	25,900	756
1999	1,352,200	26,200	823
2000	1,396,500	26,900	882
2001	1,420,800	27,000	853
2002	1,411,000	25,100	849
2003	1,436,200	25,500	889
2004	1,463,400	25,700	997
2005	1,496,500	25,200	986
2006	1,524,300	24,700	1030
2007	1,520,500	25,100	1137
2008	1,489,300	25,400	1129

Table 5c: Trends in Employment and Payroll, Riverside and San Bernardino Counties

year	Total Employment	Transportation Employment	Transportation Payroll (in millions)
1990	735,100	24,300	426
1991	741,600	27,100	492
1992	751,500	27,900	543
1993	755,800	30,400	609
1994	772,800	32,700	673
1995	801,700	35,900	736
1996	824,800	36,100	792
1997	863,200	37,800	837
1998	903,800	42,000	960
1999	960,300	44,800	1123
2000	1,010,100	46,300	1196
2001	1,050,700	45,700	1191
2002	1,084,800	46,800	1221
2003	1,119,500	50,100	1309
2004	1,178,700	55,500	1721
2005	1,240,200	60,200	1880
2006	1,285,000	63,800	2077
2007	1,285,500	66,800	2290
2008	1,222,508	64,450	2364

While transportation employment remained relatively stable in LA County and grew moderately in Orange County, the Inland Empire experienced substantial growth in transportation employment over the period (outstripping the general growth in employment in this region). The development of the Inland Empire as a region that supports considerable transportation employment is linked to its location close to the ports and to rail routes that leave the Southern California area, making it a desirable area for warehouses and distribution centers handling international freight entering the SPB ports and destined for areas outside of the Southern California Region.

To formally model the link between port traffic and employment and payroll in the four county region, we develop three models: total county employment, county transportation employment, and county transportation payroll. As the data spans counties and time, we use panel data estimation techniques for these models. All models are specified in log-log functional form, so the coefficients can be expressed as elasticities.

4A. Total Employment Model

The model of total employment has the lag of county employment, California total employment, education, inbound containers, county unemployment rate and time as explanatory variables. Using the lag of the dependent variable as an explanatory variable is sensible as employment in one period tends to be most dependent on the employment level in the prior period (thus we expect a positive sign on this coefficient). We also expect positive coefficients on California total employment and education (measured as the percent of adults with a high school education). We expect a negative coefficient on the unemployment variable, as employment and unemployment are inversely related by

definition. For the purpose of this study, our focus is on the sign and significance of the coefficient on loaded inbound containers. We expect the sign of the coefficient to be positive (more port activity should increase regional employment). Table 6 presents the estimation results. The choice of county fixed effects versus random effects was based on the results of a Hausman test, which indicated that random effects is the correct specification.

Table 6: Random Effects Estimation Results, Total County Employment

	Coef.	Std. Err.	z	P>|z|
lagged total employment	**0.968931**	**0.004013**	**241.46**	**0.00**
California Total Employment	-0.04365	0.127726	-0.34	0.73
Education	**-0.19891**	**0.047086**	**-4.22**	**0.00**
Inbound Containers	**0.164946**	**0.054964**	**3.00**	**0.00**
Unemployment Rate	**-0.00516**	**0.001692**	**-3.05**	**0.00**
Time	**-0.01694**	**0.004292**	**-3.95**	**0.00**
Overall R-squared	0.9997			
Wald Chi-squared	119324.3			
P-value of Wald	0			

The coefficient on inbound containers is positive and significant, as expected. The magnitude of the coefficient suggests that a one percent increase in loaded inbound containers through the SPB ports will increase county-level employment by 0.16% in the four county area.

4B. Transportation Employment Model

We next measure the impact of port traffic on employment in the transportation industry, which should be the industry with the most direct dependence on port activity.

The specification of the model is largely the same as that of total employment, however the dependent variable is county transportation employment and California transportation employment is used as an explanatory variable, replacing California total employment used in the prior model. The Hausman test rejects random effects at the 5% level, but not at the 10% level, so both the random effects and fixed effects estimation results are presented in Table 7. As expected, loaded inbound containers have a larger impact on transportation employment than in the prior model of total employment, but the coefficient is only statistically significant in the random effects model. The coefficient on loaded inbound containers in the random effects model suggests that a 1% increase in loaded inbound containers through the SPB ports will increase county-level transportation employment by 0.31%.

Table 7: Panel Estimation Results, County Transportation Employment

Random Effects Model				
	Coef.	Std. Err.	z	P>
lagged transportation emp	**0.941369**	**0.018754**	**50.2**	**0**
California trans. Emp	0.162234	0.208548	0.78	0.437
education	**-0.77362**	**0.219783**	**-3.52**	**0**
loaded inbound	**0.30566**	**0.162449**	**1.88**	**0.06**
time	**-0.03007**	**0.015571**	**-1.93**	**0.053**
Overall R-squared	0.9979			
Wald Chi-squared	15715.97			
P-value of Wald	0.0000			
Fixed Effects Model				
	Coef.	Std. Err.	t	P>
lagged transportation emp	**0.926577**	**0.060404**	**15.34**	**0**
California trans. Emp	0.084108	0.190169	0.44	0.661
education	-0.38518	0.238721	-1.61	0.117
loaded inbound	0.149598	0.152234	0.98	0.333

time	-0.01447	0.014496	-1	0.326
Overall R-squared	0.9977			
F-statistic	101.72			
P-value of F-stat	0.0000			

4C. Transportation Payroll Model

The last labor market model estimated is that of county level transportation payroll. Again using a panel data approach, the explanatory variables include the lagged dependent variable (real transportation payroll), California transportation gross state product, education, and loaded inbound containers. The results of the Hausman test suggest that the county effects should be measured as random effects and the estimation results are presented in Table 8.

Table 8: Random Effects Estimation Results, County Transportation Payroll

	Coef.	Std. Err.	z	P>
lagged trans payroll	**0.946666**	**0.016871**	**56.11**	**0**
California transport GSP	**1.031879**	**0.328596**	**3.14**	**0.002**
education	**-0.58069**	**0.229147**	**-2.53**	**0.011**
loaded inbound	0.259425	0.191507	1.35	0.176
time	**-0.03894**	**0.017768**	**-2.19**	**0.028**
Overall R-squared	0.9975			
Wald Chi-squared	12941.55			
P-value of Wald	0.0000			

The coefficient on loaded inbound containers suggests that a 1% increase in loaded containers through the SPB ports results in a 0.26% increase in county-level transportation payroll, however, this coefficient is only significant in a 10% one-tailed test.

It should be noted that the signs on the education variable are opposite of what is expected in all three models. We anticipate that this is due to the lack of precision in what the education variable measures, which is only the percent of residents with a high school degree. We would have preferred a more detailed measure of the degrees earned by the residents of the four counties, however, this data was not available for the most recent years. As more detailed data becomes available, the models can be re-estimated.

4D. Combining the Forecast and Labor Market Results

To estimate the impact of the declines in inbound containers through the Ports of Los Angeles and Long Beach on the regional economy, we combine the forecasts (from section 3) with the estimation results above.

Table 9 presents the actual loaded inbound container counts for 2008 as well as the forecasts for 2009 (last two quarters forecast) and 2010 for the Theory, Correlation, and Control forecasts.

Table 9: Forecast Container Counts

	Theory	Correlation	Control
2008	7,246,382	7,246,382	7,246,382
2009	5,894,153	5,802,757	5,659,733
2010	5,378,085	5,892,978	4,663,847
percent change 2008-9	-18.66%	-19.92%	-21.90%
percent change 2009-10	-8.76%	1.55%	-17.60%

Recall that the Theory and Correlation models appeared to perform best when evaluating the forecasts. These two forecasts (and not the Control model) will be used to evaluate the potential impact of declining port traffic on the regional labor market.

Table 10 presents the projected declines in total employment, transportation employment, and transportation payroll associated with the forecasted declines in inbound containers.

Table 10: Forecasted Impact on 4-County Labor Market

		Forecasted Percentage Change 2008-9		Forecasted Percentage Change 2009-10	
Model	Coefficient	Theory	Correlation	Theory	Correlation
Total Employment	0.26	-4.85%	-5.18%	-2.28%	0.40%
Transportation Employment	0.31	-5.78%	-6.18%	-2.71%	0.48%
Transportation Payroll	0.16	-2.99%	-3.19%	-1.40%	0.25%

The impact on total employment in the 4 County area from declining container counts in 2009 is estimated to range from -4.9% to -5.2%. As expected, the hit to the transportation employment is estimated to be of higher magnitude, -5.8% to -6.2%, however the decline in transportation payroll is estimated to be approximately 3%.

While the Theory forecast estimates continued declines in employment and payroll in 2010, the Correlation forecast estimates no substantial impact on the regional labor market (due to the fact that the correlation forecast actually predicts inbound containers increasing in 2010 slightly over 2009 levels).

It is perhaps more useful to translate the percentage changes into actual numbers. Table 11 presents the actual employment and payroll along with the forecasted levels of employment and payroll associated with the Theory forecast (the worst case scenario).

Table 11: Forecasts of Labor Market Outcomes by County

	Total Employment			Transportation Employment			Transportation Payroll (in millions)		
	2008	2009	2010	2008	2009	2010	2008	2009	2010
LA	4,076,200	3,878,431	3,790,141	148,500	139,910	136,725	6,764	6,562	6,470
OC	1,489,300	1,417,042	1,384,784	25,400	23,931	23,386	1,129	1,095	1,095
IE	1,222,508	1,163,194	1,136,715	64,450	60,722	59,339	2,364	2,293	2,293

5. CONCLUSIONS AND RECOMMENDATIONS

Using time series forecasting techniques, we developed multiple forecasts of inbound container traffic through the SPB Ports. These forecasts, combined with panel data labor market models, allow us to forecast the impact of declining freight volumes on total employment, transportation employment, and transportation payroll in Los Angeles and Orange Counties and the Inland Empire. We find that the decline in traffic is associated with a decline of nearly 330,000 jobs in 2009 and 147,000 jobs in 2010 in the 4-county region. Transportation employment is estimated to have declined by nearly 14,000 jobs in 2009 due to declining port activity and forecast to decline by another 5,000 in 2010.

These are preliminary results that will benefit from additional estimations as more data becomes available. While two of the forecasts were deemed acceptable using the appropriate diagnostic tools, it should be noted that neither of these forecasts predicted the sharp decline in traffic experienced in the first half of 2009. As more data become available, the forecasts became more accurate. This is not surprising, given that the fall in inbound port traffic was unprecedented. This suggests that continued data collection as time passes will allow us to extend the current forecasting models and make them more reliable.

The same recommendation applies to the regional labor market models. These may be extended with additional years of data and perhaps to include more counties. Both of these efforts are relatively low cost and will allow the development of valuable economic forecasts that are kept current and constantly re-evaluated to test the models' performance as more data become available.

6. IMPLEMENTATION

The data and models will be uploaded to a webpage accessible to area researchers and available through the Department of Economics at California State University Long Beach. The data on this page will be regularly updated.

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