

The Long-Term Prospects for Global Trade and Industrial Real Estate Demand

An analysis of a trade-based investment strategy in the midst of global economic crisis

Overview

Change in the global trade environment has been a primary driver of industrial real estate demand for decades and is central to AMB's strategy of investing in major port and airport markets¹. Given that the global economy is in the midst of an unprecedented decline, it is timely to explore the short-and long-term outlook for global trade and for industrial real estate demand.

Summary Findings:

- 80% of the historical variation in industrial real estate demand is explained by variations in trade.
- A focus on trade-centric locations means investing in logistics facilities that are closest to the primary nodes of demand. This is important as the two most critical supply chain considerations are typically service levels (speed) and transportation costs.
- Growth in trade volume is highly correlated with GDP (U.S. and global) and trade's growth as a multiple of the GDP growth rate has more than doubled over the last 50 years. In the past decade, trade's multiplier on GDP expanded to 3.5, and as a result, nominal changes in GDP growth result in significant changes in trade growth. Global expectations for GDP in 2009 imply trade should fall by approximately 10%, a view consistent with that of industry experts.
- There are four factors affecting trade data that have contributed to the recent declines in trade: inflation fluctuation; financing availability; supply chain responsiveness, and; miscounting of final products.
- Despite the current economic and financial downturn, structural support for the trade-to-GDP and trade-to-industrial-real-estate demand relationship remains intact. The global shift of labor, productivity and capital over many decades has created complex but efficient supply chains. A fundamental shift back to domestic production would take decades and require much added cost to implement.
- Consensus estimates for 2010 GDP growth in the U.S. and globally are currently at about 2.0%. This level of growth is consistent with about 500 million square feet of industrial real estate demand globally, and the beginning of a healthy recovery.

¹ More than 85% of AMB's global portfolio is located in the top 20 global markets for trade. These markets comprise the key linkages in global trade. In the U.S., AMB's target markets account for more than 80% of all containerized waterborne trade (TEUs) in the U.S.

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Global Trade Drives Demand for Industrial Real Estate

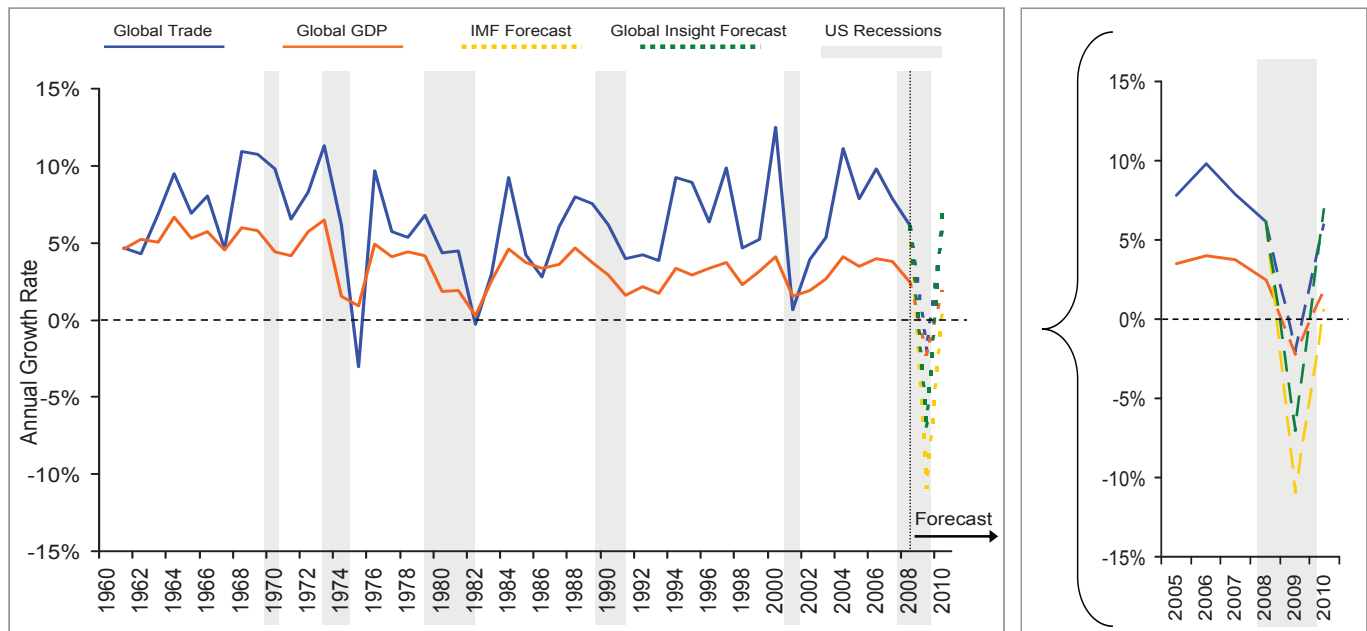
Trade is the principal determinant of demand for industrial real estate. Eighty percent of the historical variation in net absorption of industrial space is accounted for by variations in U.S. imports and exports (Appendix A). This empirical relationship has strengthened over the last two decades, driven by the globalization and interconnectedness of economies, supply chains and capital markets. While employment, manufacturing and gross domestic product (GDP) also drive demand for industrial real estate, no other single variable has a higher correlation with U.S net absorption than trade (Appendix A)².

Demand for industrial real estate is further influenced by the long-term relationship between trade and GDP (Exhibit 1). In recent decades, factors supporting globalization have intensified this relationship, resulting in global trade growing at three times the rate of global GDP growth.

This relationship supports a trade-centric investment strategy for industrial real estate – a strategy emphasizing the location of distribution and logistics facilities close to the primary source of demand. These markets are characterized by high population densities and contain the infrastructure that supports global trade. Proximity is important to customers as it helps control two of the most critical factors in the supply chain: speed and transportation costs.

At the time of this writing however, global trade appears to be in retreat, with most experts forecasting a drop of between 9–11% in 2009. Put in perspective, global trade has fallen in only two previous years since World War II: by -3.1% in 1975 (energy crisis) and by -0.3% during 1982 (global recession). To understand the magnitude and severity of the changes occurring during the current crisis, it is essential to examine the relationship between global trade and global GDP.

Exhibit 1:
Long-Term Global Trade and Global GDP Relationship



Source: World Bank, International Monetary Fund (IMF), Global Insight, AMB Property Corporation

² Although this relationship cannot be tested in other countries as reliable data does not exist, the cause and effects of globalization are felt universally.

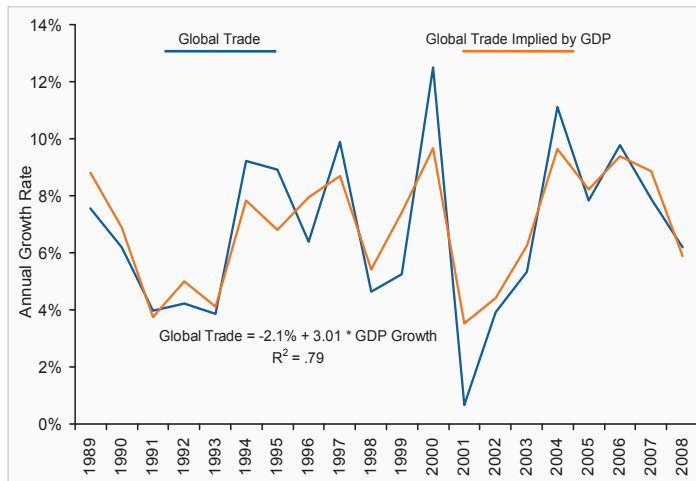


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The Interconnectedness of Global Trade and Global GDP

Trade and GDP are closely interrelated as higher levels of investment, production and consumption within a globalized country are consistent with increased levels of imports and exports. This relationship is even more pronounced on an aggregated global basis. As the world produces and consumes more, the volume of global trade increases (Exhibit 2).

Exhibit 2: Global GDP Drives Global Trade



Source: Data: World Bank. Models: AMB Property Corporation

What the data tells us:

- Over the last 20 years, variations in global GDP growth explain about 80% of the variation in the growth of global trade.
- The multiplier of global trade on GDP over the last 20 years is 3.5, which means that **1% of incremental growth in global GDP equates to 3.5% of additional growth in global trade.**

Not surprisingly, this relationship between trade and GDP in the U.S. is very similar to that of it globally. Appendix B provides the same model with U.S. trade and GDP data for comparison with the global model presented here. Exhibit 3 provides summary results of this relationship over several time periods³.

³ Detailed results are presented in Appendix C.

Exhibit 3: Global Trade and GDP Models and 2009 Trade Forecasts

Time Period	Global Trade		2009			2010	
	Multiplier on GDP	R ²	Consensus GDP	Warranted Trade		Consensus GDP	Warranted Trade
1961-2008	1.5	0.48	-2.3%	-2.3% to -4.0%	1.9%	3.3% to 3.9%	
1979-2008	2.2	0.61	-2.3%	-4.8% to -5.6%	1.9%	3.7% to 3.9%	
1989-2008	3.0	0.79	-2.3%	-5.4% to -9.0%	1.9%	3.6% to 4.5%	
1999-2008	3.5	0.86	-2.3%	-5.4% to -11.9%	1.9%	2.8% to 4.5%	

Source: Data: World Bank, Consensus Economics, May 2009. Forecast: AMB Property Corporation

What the relationship implies:

- Trade has grown increasingly more sensitive to movements in GDP, as the multiplier has increased from 1.5 over the 48-year period to 3.5 in the last decade.
- GDP has become an increasingly strong indicator of global trade. While GDP explains approximately 48% of the variation in trade over 48 years, it explains 80% of the variation in trade over the last 20 years, and 86% of the variation in trade over the last decade.
- The Warranted Trade columns of Exhibit 3 indicate that the expectations for substantial losses in trade in 2009 are consistent with global estimates of GDP. **The expected drop in trade in 2009 of approximately -10% is explained by an unprecedented same-year drop in global GDP. The model also predicts a sharp rebound in 2010 with a corresponding improvement in GDP.**
- We see no evidence that any structural changes to trade or global supply chains have taken place. The changes in these models (increased multiplier and correlation) took many decades to materialize. While in the short run there may be minor deviations from this model, influenced by such factors as price changes or credit availability, the long-term structure of the models supporting the relationship between trade and industrial real estate absorption remain intact.

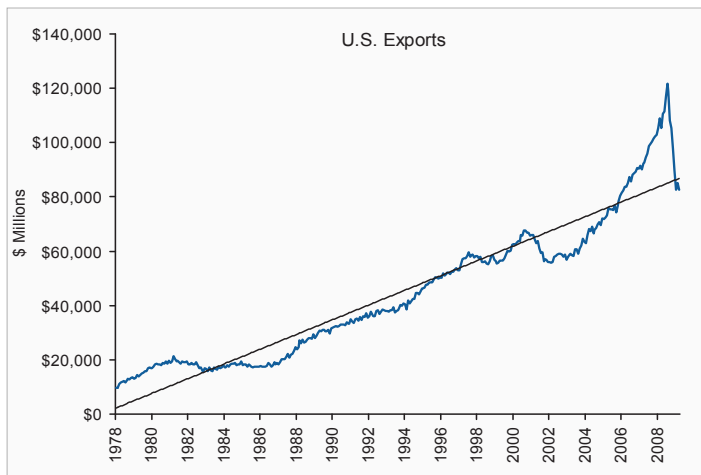
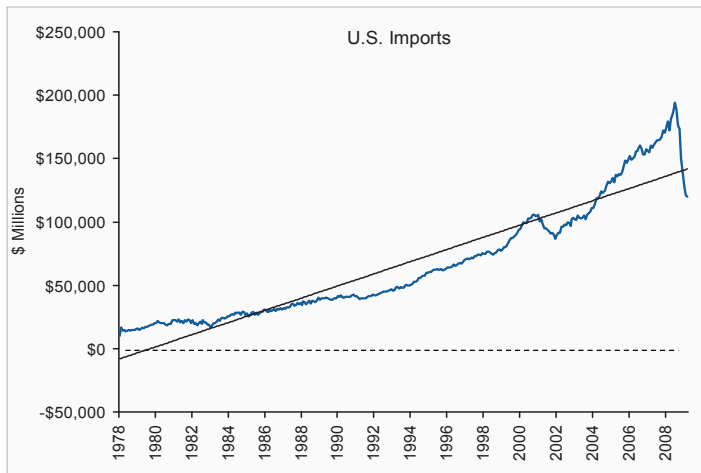
Given the severity of the current economic downturn, it is reasonable to ask whether the projected decline in global trade represents a cyclical pause or a secular shift.



Was Trade Growing Too Fast in Recent Years?

While trade has been growing at an increasing multiple to GDP, trade appears to have gotten ahead of itself in recent years, potentially fueled by global credit availability and increases in prices of many commodities (Exhibit 4).

Exhibit 4:
U.S. Imports and Exports of Goods and Trend (Jan 1978–Mar 2009)



Source: U.S. Census Bureau, Bureau of Economic Analysis, AMB Property Corporation

However, it is unclear if this growth was rooted in changes in the fundamental relationship between global trade and global GDP. To test this hypothesis, we compared regressions of global trade growth on GDP growth for three 10-year periods: 1999 to 2008 (the most recent period); 1994 to 2003 (the pre-housing bubble); and 1996 to 2005 (the pre-commodity bubble). The multiplier of trade on GDP was slightly higher in the earlier, pre-housing and pre-commodity periods, implying that **there has been no structural change in the relationship between trade and GDP in recent years**. In fact, the strongest linkage between trade and GDP was formulated in the 1990s with the opening of many global markets (Appendix D).

Therefore the “excess” growth of trade in Exhibit 4 is actually the trade growth that was warranted by world economic growth in those years. While trade and GDP growth have collapsed in recent quarters, as of March 2009 we have returned to import and export levels below long-term trend, indicating that **we are approaching the next phase of trade growth**.

Why Global Trade Forecasts Appear Worse than “Expected”

First-quarter data from countries, seaports and airports indicate a steeper decline than the annual-trade-to-GDP forecast. We believe this data overstates the decline, given four unique factors affecting trade data:

- 1. Use of real vs. nominal pricing:** The trade and absorption models in this paper utilize real (inflation-adjusted) GDP and trade data. Almost all of the national trade statistics are reported in nominal local currencies and therefore are affected by changes in currencies and prices. With severe declines in commodity and material prices in the last year, the trade data is impacted by the reported nominal changes. For example, the crude oil component of U.S. imports is down much more than the physical volume of oil imports, reflecting lower oil prices and **not lower real trade**.



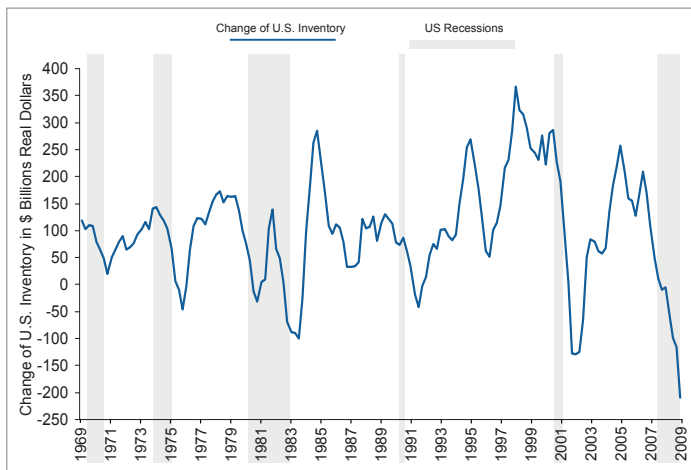
2. Financing availability: The lack of available trade financing, unique to this downturn, has likely caused trade volumes to fall much more severely than expected, as there was an immediate cessation of new orders and production late last year. Not only was credit eliminated for many importers, many exporters were unwilling to accept credit from foreign banks. This issue has since been addressed by the IMF, and many countries have enacted measures to ease this impediment to trade. The lack of available trade credit has also exacerbated the reduction in inventories. While in many cases inventories have been purposefully driven lower, prior to and during the cycle, a lack of financing caused a further reduction to below desired levels.

3. Supply chain responsiveness: In recent years, supply chains have become increasingly extended and complex, and as a result, they are now much more sensitive to changes in final demand. Inventories in the U.S. began falling in early 2007, several quarters before the start of the recession. Never before had inventories dropped in anticipation of an economic downturn. In fact, during the four preceding recessions, inventories did not begin to fall until the recession had run its course (Exhibit 5). The inventory depletion process accelerated in the third quarter of 2008, as companies, especially retailers, cut back on orders in response to the steep drop in consumption. Inventories are extremely low by historic standards, and we expect the economic recovery to lead to a sharp restocking throughout the supply chain, as this adjustment process reverses course. This will in turn result in a strong rebound in global trade.

4. Counting of final products: Global trade statistics are calculated in a manner that exaggerates the magnitude of sudden changes in the rate of growth or decline in trade. First, by definition, an export from one country is also counted as an import into another country, so these transshipments lead to a double counting of trade flows. Second, global sourcing further exaggerates trade flows as components cross national borders multiple times before they are assembled into final products. For example, take the case of a computer that is assembled in Korea from components sourced from several different countries before being shipped to the U.S. In this example, the export of each component to Korea together with the export of the finished computer to the U.S. will count as a separate trade movement resulting in a higher aggregate trade volume. Therefore the cancellation of this computer order in the U.S. will cause a multiplier effect throughout the supply chain, on top of the normal double counting of exports and imports. From a real estate perspective however, work-in-progress inventories will require space at each interim node of production and distribution resulting in higher aggregate demand for industrial space around the world.

Going forward, we expect inflation to have a lessening effect on trade data and believe pent-up demand from the lack of available financing and inventory replenishment will propel near-term recovery. Most seaports and airports have begun to report better trade and cargo data than in the earlier part of the year. We believe that the bottom of the decline has likely passed and expect the data to continue to improve over the remainder of this year.

Exhibit 5:
Rolling Four Quarters of Real Inventories



Source: Bureau of Economic Analysis



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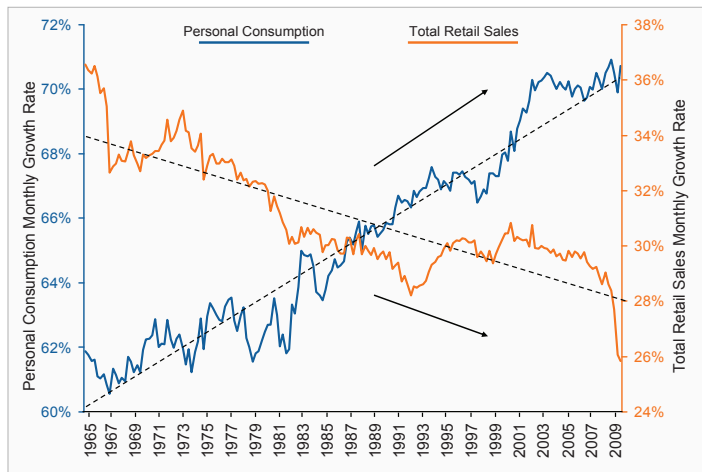
Is U.S. Consumption Unsustainable?

An often-discussed potential drag to global trade and demand for industrial real estate would be an adjustment of U.S. consumption relative to GDP. It's interesting to note that neither retail sales nor consumption are strong drivers of industrial demand. They each explain about 50% of the historical variation in demand, while trade explains 86% of the variation in recent years. However, both are still important components of the overall demand equation and they will have an impact on demand.

As of the first-quarter 2009, consumption levels are very close to their long-term trend relative to GDP. Contrary to popular perception, retail sales are on a long-term decline relative to GDP, as a larger proportion of the nation's income is spent on housing, education, leisure, health care and household services, which are not included in retail sales. Exhibit 6 shows personal consumption expenditures and retail sales as a percentage of GDP over the last 44 years (all nominal).

While consumption may adjust from recent levels relative to GDP, this adjustment could happen relatively quickly and consumption and retail sales would grow when GDP growth returns.

Exhibit 6:
U.S. Consumption and Retail Sales Relative to Nominal GDP



Source: Bureau of Economic Analysis, U.S. Census Bureau, AMB Property Corporation

Is Global Trade Changed Forever?

Clearly, we are in an extraordinary time. In 2009 we will experience the first drop in global GDP and the steepest decline in global trade in modern history. Trade and industrial real estate demand are more aligned than ever, a relationship that holds true as well between trade and GDP. As trade is the primary driver of global industrial real estate demand, we are forecasting a few more difficult quarters for most regions of the world.

The evolution of global trade has been many decades in the making, driven by the structural transformation of the developed economies into information- and service-based economies, and the transformation of agriculture-based economies to emerging industrialized economies. **This global shift of labor, productivity and capital over many decades has created complex, but highly efficient supply chains, and these benefits would take decades and significant costs to reverse in any meaningful way.**

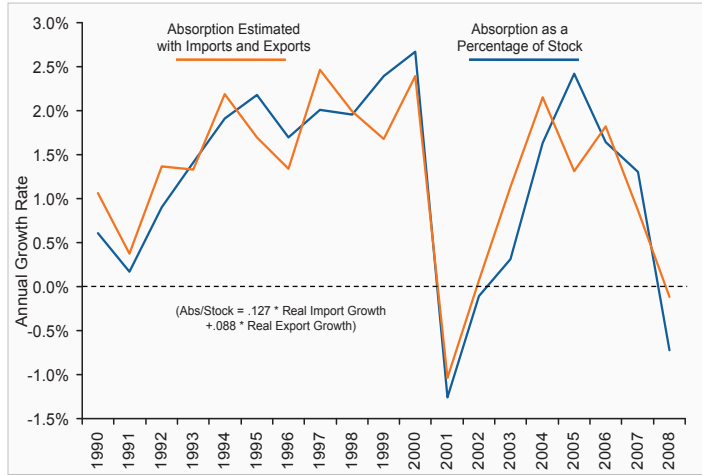
While the global economy is still in a deep recession, there are some early signs that trade volumes may be stabilizing. As we look forward to 2010, the current consensus estimate for U.S. and global GDP is about 2%, a figure that implies a global rebound in trade and industrial demand. Based on the models presented in this paper, this level of growth equates to approximately 500 million square feet of global demand for industrial real estate, the beginning of a healthy recovery. We believe that today's global trade and GDP declines represent a temporary pause in an otherwise strong, long-standing secular trend that will continue to drive demand for quality industrial real estate and, in particular, AMB's product for many years to come.



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Appendix A: Trade Drives Absorption

U.S. Trade is highly correlated with absorption



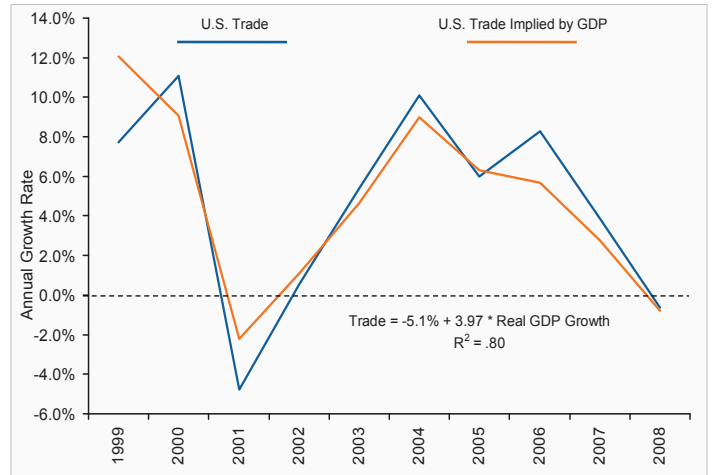
Dependent Variable: ABS01 Absorption (Percent of Stock)				
Method: Least Squares				
Sample: 1990 2008				
	Coefficient	Std. Error	t-Statistic	Prob.
Imports\$ (Real)	0.13	0.03	5.10	0.00
Exports\$ (Real)	0.09	0.03	3.13	0.01
R-squared	0.79	Mean dependent var		0.01
Adjusted R-squared	0.78	S.D. dependent var		0.01
S.E. of regression	0.01	Akaike info criterion		-7.59
Sum squared resid	0.00	Schwarz criterion		-7.49
Log likelihood	74.06	Hannan-Quinn criter.		-7.57
Durbin-Watson stat	2.04			

AMB has created and documented many models that explain industrial demand. These models have included variables such as GDP, employment by industry groups, truck shipments and manufacturing output[^]. Of all the independent variables tested, imports and exports have the highest explanatory power for U.S. industrial demand and for that of many U.S. metropolitan areas. The above graph shows actual U.S. absorption as a percent of stock; the orange line is the absorption predicted by growth in real U.S. imports and exports, which together explain about 78% of the historical variation in net absorption.

[^] See AMB IAI White Paper, "Determinants of Industrial Demand," AMB Property Corporation, July 3, 2002. Appendix A

Appendix B: U.S. GDP Drives U.S. Trade

U.S. Trade and U.S. GDP



As expected, the relationship between U.S. trade and U.S. GDP is very similar to the relationship between global trade and global GDP. Like global trade and GDP, the correlation (R^2) and coefficient of U.S. trade and U.S. GDP has been increasing for many decades. The correlation (R^2) and coefficients for the U.S. and global models are very similar and therefore, like the global model, the U.S. model would expect a low double-digit decline in trade in 2009 and a rebound in 2010, given recent consensus estimates for GDP as the input.



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Appendix C: Detailed Regression Results: World Trade as a Function of World GDP

Constant				No Constant					
Dependent Variable: EXPORT Method: Least Squares Sample: 1999 2008 Included observations: 10				Dependent Variable: EXPORT Method: Least Squares Sample: 1999 2008 Included observations: 10					
	Coefficient	Std. Error	t-Statistic	Prob.		Std. Error	t-Statistic	Prob.	
C	-0.038602	0.015259	-2.5299	0.0353	GDP	2.353812	0.16419	14.33589	0
GDP	3.497185	0.470215	7.437419	0.0001					
R-squared	0.873648	Mean dependent var	0.070472		R-squared	0.77256	Mean dependent var	0.070472	
Adjusted R-squared	0.857854	S.D. dependent var	0.035329		Adjusted R-squared	0.77256	S.D. dependent var	0.035329	
S.E. of regression	0.01332	Akaike info criterion	-5.62228		S.E. of regression	0.016849	Akaike info criterion	-5.23446	
Sum squared resid	0.001419	Schwarz criterion	-5.56176		Sum squared resid	0.002555	Schwarz criterion	-5.20421	
Log likelihood	30.11139	Hannan-Quinn criter.	-5.68866		Log likelihood	27.17232	Hannan-Quinn criter.	-5.26766	
F-statistic	55.3152	Durbin-Watson stat	2.731128		Durbin-Watson stat	2.987092			
Prob(F-statistic)	0.000074								
Dependent Variable: EXPORT Method: Least Squares Sample: 1989 2008 Included observations: 20				Dependent Variable: EXPORT Method: Least Squares Sample: 1989 2008 Included observations: 20					
	Coefficient	Std. Error	t-Statistic	Prob.		Coefficient	Std. Error	t-Statistic	Prob.
C	-0.021144	0.010911	-1.93791	0.0685	GDP	2.350789	0.104801	22.43097	0
GDP	3.013818	0.355878	8.468672	0					
R-squared	0.799372	Mean dependent var	0.067687		R-squared	0.757514	Mean dependent var	0.067687	
Adjusted R-squared	0.788226	S.D. dependent var	0.02918		Adjusted R-squared	0.757514	S.D. dependent var	0.02918	
S.E. of regression	0.013428	Akaike info criterion	-5.68826		S.E. of regression	0.014369	Akaike info criterion	-5.59877	
Sum squared resid	0.003246	Schwarz criterion	-5.58869		Sum squared resid	0.003923	Schwarz criterion	-5.54898	
Log likelihood	58.88262	Hannan-Quinn criter.	-5.66882		Log likelihood	56.98768	Hannan-Quinn criter.	-5.58905	
F-statistic	71.71841	Durbin-Watson stat	2.665818		Durbin-Watson stat	2.781568			
Prob(F-statistic)	0								
Dependent Variable: EXPORT Method: Least Squares Sample: 1979 2008 Included observations: 30				Dependent Variable: EXPORT Method: Least Squares Sample: 1979 2008 Included observations: 30					
	Coefficient	Std. Error	t-Statistic	Prob.		Coefficient	Std. Error	t-Statistic	Prob.
C	-0.005045	0.010419	-0.48418	0.632	GDP	2.071201	0.106224	19.49846	0
GDP	2.22206	0.329652	6.740623	0					
R-squared	0.618716	Mean dependent var	0.061334		R-squared	0.615523	Mean dependent var	0.061334	
Adjusted R-squared	0.605098	S.D. dependent var	0.029656		Adjusted R-squared	0.615523	S.D. dependent var	0.029656	
S.E. of regression	0.018636	Akaike info criterion	-5.06309		S.E. of regression	0.018388	Akaike info criterion	-5.12142	
Sum squared resid	0.009725	Schwarz criterion	-4.96968		Sum squared resid	0.009806	Schwarz criterion	-5.07472	
Log likelihood	77.9464	Hannan-Quinn criter.	-5.03321		Log likelihood	77.82134	Hannan-Quinn criter.	-5.10648	
F-statistic	45.436	Durbin-Watson stat	1.55231		Durbin-Watson stat	1.621782			
Prob(F-statistic)	0								
Dependent Variable: EXPORT Method: Least Squares Sample: 1961 2008 Included observations: 48				Dependent Variable: EXPORT Method: Least Squares Sample: 1961 2008 Included observations: 48					
	Coefficient	Std. Error	t-Statistic	Prob.		Coefficient	Std. Error	t-Statistic	Prob.
C	0.011038	0.00867	1.273033	0.2094	GDP	1.730527	0.08332	20.76953	0
GDP	1.470527	0.220373	6.67289	0					
R-squared	0.491867	Mean dependent var	0.064658		R-squared	0.473965	Mean dependent var	0.064658	
Adjusted R-squared	0.480821	S.D. dependent var	0.031315		Adjusted R-squared	0.473965	S.D. dependent var	0.031315	
S.E. of regression	0.022563	Akaike info criterion	-4.7042		S.E. of regression	0.022712	Akaike info criterion	-4.71124	
Sum squared resid	0.023419	Schwarz criterion	-4.62623		Sum squared resid	0.024244	Schwarz criterion	-4.67226	
Log likelihood	114.9008	Hannan-Quinn criter.	-4.67474		Log likelihood	114.0698	Hannan-Quinn criter.	-4.69651	
F-statistic	44.52746	Durbin-Watson stat	1.648402		Durbin-Watson stat	1.435712			
Prob(F-statistic)	0								



Appendix D: Detailed Regression Results: World Trade as a Function of World GDP

"Pre-Housing", "Pre-Commodity" and most recent decade				
Dependent Variable: EXPORT				
Method: Least Squares				
Sample: 1999 2008				
Included observations: 10				
	Coefficient		Std. Error t-Statistic	Prob.
C	-0.038602		0.015259 -2.5299	0.0353
GDP	3.497185		0.470215 7.437419	0.0001
R-squared	0.873648	Mean dependent var	0.070472	
Adjusted R-squared	0.857854	S.D. dependent var	0.035329	
S.E. of regression	0.01332	Akaike info criterion	-5.62228	
Sum squared resid	0.001419	Schwarz criterion	-5.56176	
Log likelihood	30.11139	Hannan-Quinn criter.	-5.68866	
F-statistic	55.3152	Durbin-Watson stat	2.731128	
Prob(F-statistic)	0.000074			
Dependent Variable: EXPORT				
Method: Least Squares				
Sample: 1996 2005 "Pre Commodity"				
Included observations: 10				
	Coefficient		Std. Error t-Statistic	Prob.
C	-0.045454		0.014843 -3.06235	0.0155
GDP	3.726999		0.47098 7.913284	0
R-squared	0.886718	Mean dependent var	0.067509	
Adjusted R-squared	0.872557	S.D. dependent var	0.036015	
S.E. of regression	0.012857	Akaike info criterion	-5.693	
Sum squared resid	0.001322	Schwarz criterion	-5.63248	
Log likelihood	30.46498	Hannan-Quinn criter.	-5.75938	
F-statistic	62.62006	Durbin-Watson stat	2.784802	
Prob(F-statistic)	0.000047			
Dependent Variable: EXPORT				
Method: Least Squares				
Sample: 1994 2003 "Pre-Housing"				
Included observations: 10				
	Coefficient		Std. Error t-Statistic	Prob.
C	-0.043762		0.019223 -2.27653	0.0524
GDP	3.818644		0.641656 5.951229	0.0003
R-squared	0.815741	Mean dependent var	0.06674	
Adjusted R-squared	0.792709	S.D. dependent var	0.034559	
S.E. of regression	0.015735	Akaike info criterion	-5.28905	
Sum squared resid	0.001981	Schwarz criterion	-5.22854	
Log likelihood	28.44527	Hannan-Quinn criter.	-5.35544	
F-statistic	35.41713	Durbin-Watson stat	2.816513	
Prob(F-statistic)	0.000342			





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About the Author

David C. Twist is vice president, Research for AMB Property Corporation, responsible for the company's global research initiatives. Twist has been in real estate related research since 1990. He is a member of the National Association of Industrial & Office Properties (NAIOP) and the CFA Institute. Twist received a Bachelor's degree in Quantitative Economics from the University of California, San Diego.

About AMB Property Corporation®

AMB Property Corporation® is a leading owner, operator and developer of industrial real estate, focused on major hub and gateway distribution markets in the Americas, Europe and Asia. As of March 31, 2009, AMB owned, or had investments in, on a consolidated basis or through unconsolidated joint ventures, properties and development projects expected to total approximately 159.0 million square feet (14.8 million square meters) in 48 markets within 14 countries. AMB invests in properties located predominantly in the infill submarkets of its targeted markets. The company's portfolio is comprised of High Throughput Distribution® facilities--industrial properties built for speed and located near airports, seaports and ground transportation systems.

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