

# GUY CARPENTER



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## Modelling Cargo Accumulation

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## Focus of Today's Discussion

### Cargo Accumulation Modelling



- **Risk Identification**

- Determine exposure aggregations from individual insured risks located in ports

- **Risk Assessment**

- Develop credible losses associated with exposure accumulations
- Identify loss drivers by geography / perils / commodities
- Understand the effects of seasonality on losses

- **Risk Control and Financing**

**Cargo exposure accumulation can be a significant risk that is little understood and rarely quantified**

## The Guy Carpenter's Approach

### Key features



- Guy Carpenter's International Trade Database (ITD)
  - A comprehensive, proprietary database of historical trade patterns which identifies monthly accumulation and seasonality of imports and exports by key product categories for major seaports, airports and distribution centers
  - Information covers over **29** countries and is updated monthly
  - Values can be adjusted for either wholesale or retail
  - Addresses both containers and bulk

**ITD is an excellent alternative when there is limited client information**

## The Guy Carpenter's Approach

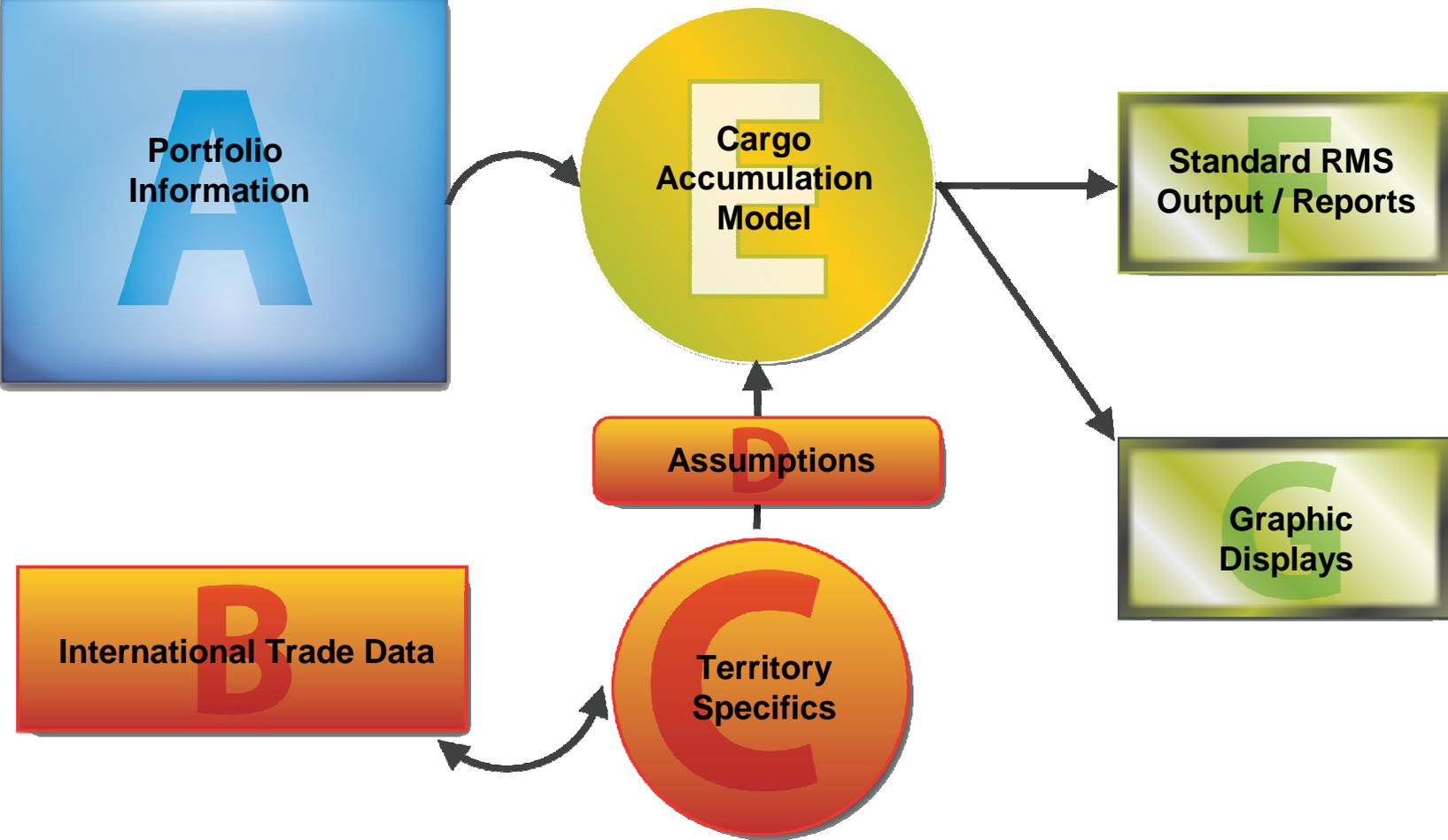


- Detailed output reports loss by geography, peril, monthly trend and product line
  - Results address key questions such as
    - What **types** / quantity of cargo are being shipped?
    - Where is the cargo travelling **from and to**?
    - Where are the key cargo accumulation **areas**?
    - When are the **seasonality** concerns?
    - What are the key **loss drivers** based on area, peril, product category and point in time?

**Latest technology minimises subjectivity and generates a comprehensive exposure and loss analysis**

# Cargo Accumulation

An Advanced Approach

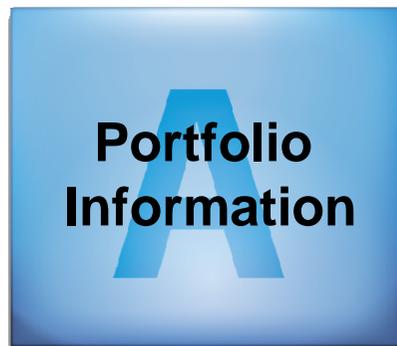


Making the latest technology productive

## Cargo Accumulation Data Requirements



- An ideal situation
  - Shipment date
  - Source and destination of shipment
  - Commodity description
  - Shipment value (wholesale or retail)



**Insurer information at this level is often limited**

## Cargo Accumulation

### Underlying Trade Information



- GC's proprietary International Trade Database (ITD) is a comprehensive file of historical trade patterns
- Identifies the magnitude and seasonality of international trade volumes at major global seaports, airports and distribution centers
- Segments trade volume by commodity description at each port
- Updated monthly

**International  
Trade Data**

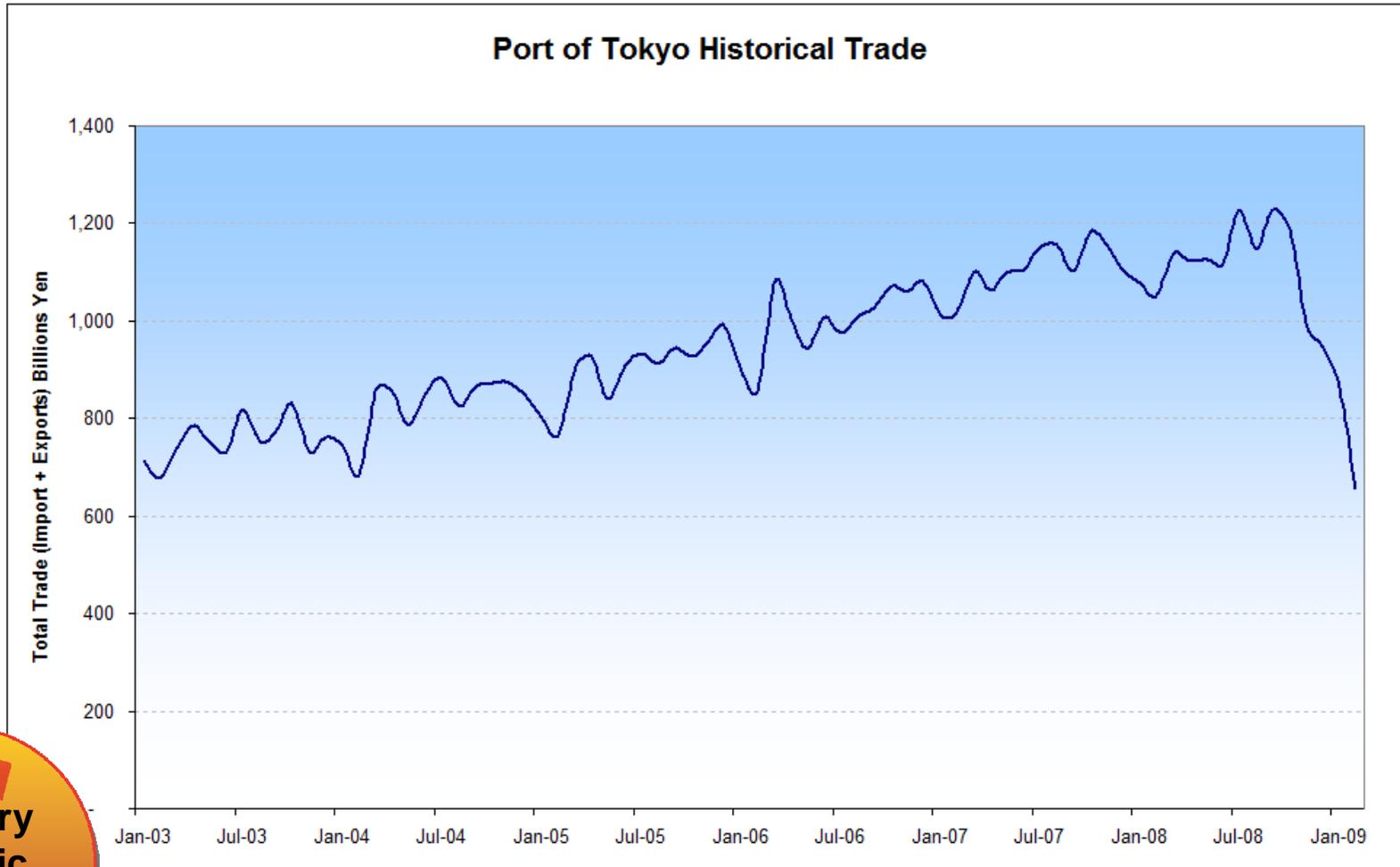
**ITD can be used to fill in data voids**

# Cargo Accumulation

Example, Historical Trade Patterns



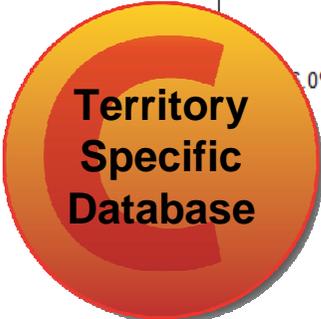
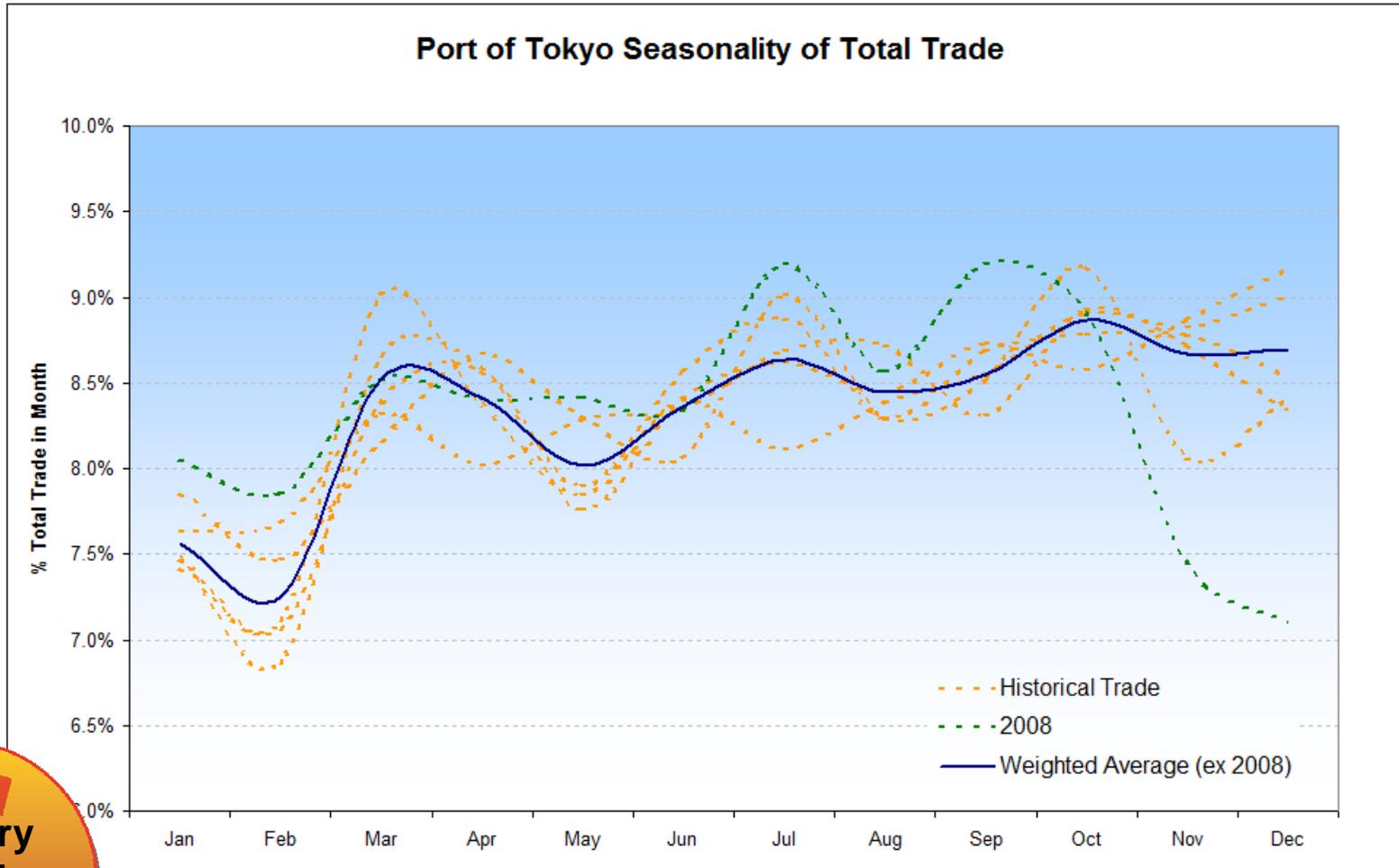
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Monthly trade volumes for major ports and shipping routes

# Cargo Accumulation

## Example, Trade Seasonality



**Seasonal trends are incorporated into analysis**

## Cargo Accumulation

### Key Assumptions



- Port lag time, which can be varied by
  - Country
  - Port
  - Product Type
- Number of days port operates
- *All assumptions are subject to client review and confirmation*
- Avoids need to estimate average TEU value in most cases

**Assumptions**

**Client defined parameters**

# Cargo Accumulation Vulnerability



- Guy Carpenter's cargo accumulation loss incorporates **geography** (port location), **perils** (windstorm, earthquake, fire following) and **cargo types** (product line classes)
- RMS software generates standard “probabilistic” output, such as occurrence exceedance probability (OEP) and average annual loss, quantifies risk potential

OEP is the probability that a loss from a single event will exceed a given amount



**Process combines credible exposure data and unique vulnerability curves with latest simulation technology**

# Cargo Accumulation

Occurrence Exceedance Probability Results (Sample)



Annual Probability of Non-Exceedance	Return Period	Peril	
		CA Earthquake	U.S. Hurricane
		February	September
90.00%	10	\$5,326,613	\$3,790,320
95.00%	20	\$7,256,896	\$5,952,040
98.00%	50	\$10,523,709	\$9,179,320
<b>99.00%</b>	<b>100</b>	<b>\$15,500,000</b>	<b>\$13,297,400</b>
99.60%	250	\$19,872,395	\$16,655,920
99.80%	500	\$26,082,226	\$21,543,760
99.90%	1,000	\$30,977,373	\$25,540,800
<b>Pure Premium</b>		<b>\$174,950</b>	<b>\$109,664</b>



**Analysis suggests there is a 99.0% chance in any given year, not to exceed \$15.5 million from a California earthquake.**

## Cargo Accumulation

### Managing Risk Effectively



- Loss modelling output is of a standardised form
  - Can be **combined** with other catastrophe modelling output
  - **Correlations** between classes can be incorporated
  - Event loss tables can be used in stochastic modelling aiding
    - **Capital allocation** (insurers & reinsurers)
    - **Portfolio management**
    - **Risk management** and **insurance purchasing**

**Results**

**Ultimately, output can be used to better assess capital requirements**

## Benefits of Our Approach



- Assess the potential **seasonality** of accumulation magnitude
- Assess **PMLs** more accurately and more consistently
- Improve **capital modelling**
- Provide information to insurers & reinsurers to achieve more **reflective pricing**
- Assess the **optimal level** of cargo reinsurance cover more accurately
- **Aggregate** exposure accumulation estimates with other lines of business

An opportunity to better understand your risk from cargo accumulation



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## Thank You for Listening

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