

Imports_Goods and vacancy



We are working on Moody's dataset with multiple features and responses for each market. It is quarterly data that means, that every quarter, new record come for each market. It is real estate dataset.

I am currently working with feature name Imports_Goods and response vacancy. Help me understand how it worked

Great question. Let's break **Imports_Goods** → **Vacancy** in a way that is **economically intuitive, realistic for Moody's quarterly data**, and useful for modeling & client explanation.

1 What exactly is Imports_Goods in a real estate context?

In Moody's macro data, **Imports_Goods** typically measures the **value or volume of goods imported into the US (or region)**.

Think of it as a proxy for:

- Strength of **consumer demand**
- Intensity of **business activity**
- Health of **global trade & supply chains**

It is **not a direct real estate variable**, but a **leading / coincident macro signal** that flows into property markets.

2 Core economic transmission mechanism to vacancy

Imports_Goods affects vacancy through **three main channels**, and the importance varies by property type.

(A) Industrial / Logistics – STRONGEST link

Mechanism

rust

Higher Imports_Goods
 → More goods entering ports & distribution networks
 → Higher demand **for** warehouses, logistics hubs, cold storage
 → Lower industrial vacancy

Quarterly behavior

- Often **leads vacancy by 1-3 quarters**

- Spikes around inventory restocking cycles

Real-world intuition

- Amazon, Walmart, 3PLs expand space when imports surge
- Port-adjacent markets (LA, Savannah, NJ, Houston) react faster

Expected sign

- **Negative relationship** with industrial vacancy

(B) Office – INDIRECT & LAGGED

Mechanism

csharp

```
Higher Imports_Goods
→ Higher business revenues & trade activity
→ Expansion in supply chain management, procurement, finance
→ Gradual increase in office demand
→ Lower office vacancy (with lag)
```

But...

- Post-COVID, this link weakened due to WFH
- Works better in:
 - Trade-heavy metros
 - Corporate HQ markets

Expected sign

- Weak negative or neutral
- Often **market-specific**

(C) Retail – MIXED but meaningful

Mechanism

arduino

```
Higher Imports_Goods
→ More consumer goods available
→ Higher retail sales & inventory turnover
→ Stronger retailer confidence
→ Lower retail vacancy
```

Risk

- Excess imports can also cause:
 - Overstocking

- Store closures later

So relationship can be:

- Short-term negative
- Long-term nonlinear

(D) Multifamily – VERY INDIRECT

Mechanism

nginx

```
Higher Imports_Goods
→ Stronger economy
→ Job growth
→ Household formation
→ Lower MF vacancy
```

But this channel is:

- Weak
- Lagged
- Usually dominated by labor market variables

3 Why the relationship is NOT contemporaneous

This is crucial for quarterly modeling.

Imports happen first. Space absorption happens later.

Typical lags:

- Industrial: **1-2 quarters**
- Retail: **2-3 quarters**
- Office: **3-5 quarters**

If you use Imports_Goods at the same quarter, the signal may look weak or noisy.

4 What the model is *actually* learning

When Imports_Goods shows up as important, your model is likely capturing:

- **Macro demand cycle**
- **Inventory build vs drawdown**
- **Trade-driven business confidence**
- **Global-to-local spillover**

It is acting as a **leading indicator of space demand**, not a causal driver by itself.

5 Why this feature works well in a global / pooled model (your setup)

Given your experience with:

- Multiple markets
- Global model vs market-level models

Imports_Goods helps because:

- It introduces a **shared macro signal**
- Markets respond with **different elasticities**
- Tree / nonlinear models learn these differences automatically

This helps justify:

“We are not forcing one relationship; we are allowing markets to react differently to the same macro shock.”

6 Typical patterns you should expect in data

Scenario	Imports_Goods	Vacancy
Trade boom	↑	↓ (after lag)
Recession	↓	↑
Supply chain shock	↓ abruptly	↑ later
Overstock cycle	↑ sharply	↓ then ↑

7 How to explain this to non-technical stakeholders

“Imports of goods capture the pulse of trade and consumption. When imports rise, it signals that companies are moving more products through supply chains, which increases demand for industrial and related real estate. This demand typically shows up in lower vacancy with a lag of a few quarters.”

8 Key caution (very important)

Imports_Goods:

- Is **cyclical**

- Is **volatile**
- Can create **false signals** during:
 - Trade wars
 - Tariff changes
 - Pandemic-style disruptions

So it should **never stand alone**—it works best with:

- Employment
- Industrial production
- Retail sales
- Inventory ratios

9 If you want next

I can:

- Show **industry-grade feature engineering** specifically for `Imports_Goods`
- Help you **diagnose lag structure** statistically
- Help you **explain causality vs correlation** for clients
- Tie this directly to **industrial vs retail vs office vacancy differences**

Just tell me which direction you want to go next.



Help with out of box features engineering for this column.

Perfect — since you're already deep into **Moody's quarterly real-estate modeling**, I'll skip generic lags/diffs and focus on **"out-of-the-box, industry-grade" feature engineering for `Imports_Goods` → vacancy that top real estate / macro teams actually use.**

I'll group these by **economic intuition**, not math tricks.

1 Trade-cycle & inventory behavior (very powerful)

1. Import Momentum Regime

Captures *how aggressive firms are right now.*

Idea

```
text
```

```
Import_Momentum = (Imports_Goods / MA_4(Imports_Goods)) - 1
```

Why it works

- Positive → firms are accelerating orders
- Negative → firms are pulling back

Vacancy impact

- Industrial vacancy falls when momentum > 0
- Momentum turns before vacancy does

2. Import Shock Intensity

Captures *abnormal trade surges or collapses*.

```
text
```

```
Import_Shock = (Imports_Goods - MA_8) / STD_8
```

Why

- Extreme values often precede:
 - Warehouse congestion
 - Rapid leasing or sudden pullbacks

Models love this because vacancy reacts **non-linearly** to shocks.

3. Inventory Stress Proxy

(Used implicitly by logistics REIT analysts)

```
text
```

```
Import_Stress = QoQ_Imports_Growth - MA_4(QoQ_Imports_Growth)
```

Interpretation

- High → inventory piling up
- Negative → destocking phase

Vacancy

- Destocking → vacancy rises after 1–2 quarters

Structural demand vs noise separation

4. Structural Import Trend

Separates *long-term trade growth* from quarterly noise.

```
text

Import_Trend = HP_Filter_Trend(Imports_Goods)
```

Why

- Structural growth supports long-term absorption
- Cyclical noise should not drive vacancy forecasts alone

Very useful in **global models**.

5. Cyclical Deviation from Trend

```
text

Import_Cycle = Imports_Goods - Import_Trend
```

Vacancy reacts mostly to this, not the trend itself.

3 Market sensitivity features (client-friendly)

6. Market Import Exposure Index

(Highly defensible to clients)

```
text

Market_Import_Exposure =
  (Avg Imports_Goods in Market) /
  (National Avg Imports_Goods)
```

Why

- Port & logistics markets respond more
- Inland markets respond less

Lets your **global model learn heterogeneous effects**.

7. Import Elasticity Score (rolling)

```
text

Elasticity = Cov(Imports_Goods, Absorption, 12q) /
             Var(Imports_Goods, 12q)
```

Interpretation

- High → trade-driven leasing market
- Low → domestically driven market

This is *very* “top-tier consulting style”.

4 Regime & turning-point detection (gold for vacancy)

8. Trade Expansion vs Contraction Flag

```
text

Trade_Regime = 1 if
    Imports_Goods > MA_4 and
    QoQ_Growth > 0
else 0
```

Why

- Vacancy behaves completely differently across regimes
- Prevents average-effect bias

9. Import Peak Indicator

```
text

Peak_Flag = 1 if
    Imports_Goods < Lag1 and
    Lag1 > Lag2
```

Why

- Vacancy often rises **after import peaks**
- Extremely valuable for early warning

5 Interaction features (this is where alpha lives)

10. Imports × Industrial Production

```
text

Trade_Throughput = Imports_Goods × Industrial_Production
```

Why

- Imports alone ≠ usage
- This captures goods *actually moving through the economy*

11. Imports × Employment

text

$\text{Trade_Employment_Pull} = \text{Imports_Goods} \times \text{Logistics_Employment}$

Vacancy falls fastest when **both** are strong.

6 Stress & fragility indicators

12. Import Volatility

text

$\text{Import_Volatility} = \text{STD}(\text{QoQ_Growth}, 8q)$

Why

- High volatility → cautious leasing
- Predicts delayed vacancy normalization

13. Import Collapse Speed

text

$\text{Collapse_Speed} = \text{Min}(\text{QoQ_Growth over last 4q})$

Fast collapses lead to **sharp vacancy spikes**.

7 Advanced but realistic (used by big shops)

14. Import Persistence Index

text

$\text{Persistence} = \text{Corr}(\text{Imports_Goods}_t, \text{Imports_Goods}_{t-1} \text{ over } 12q)$

High persistence → durable demand

Low persistence → speculative inventory

15. Trade-Driven Demand Score (Composite)

text

$\text{Score} = z(\text{Import_Momentum})$

```
+ z(Import_Cycle)
- z(Import_Volatility)
+ z(Market_Import_Exposure)
```

This single index is **very easy to explain to clients**.

8 What I'd actually deploy (practical short list)

If I had to pick **only 5** for production:

1. Import_Momentum
2. Import_Shock_Intensity
3. Import_Cycle (trend-adjusted)
4. Market_Import_Exposure
5. Trade_Regime Flag

These give you:

- Leading signal
- Non-linearity
- Market heterogeneity
- Turning points

If you want, next I can:

- Tailor these **by property type** (industrial vs retail vs office)
- Show **lag selection logic**
- Help convert these into a **client-ready narrative**
- Map them directly into **causal vs predictive framing**

Just tell me where you want to go next.



Sorry I was asking can you look for some more top notch features engineering which top real estate industry use

Got it — let's go **one level above "good modeling" and into what large RE shops, REIT research teams, and macro strategy desks actually do**, especially for **Imports_Goods → vacancy**. I'll avoid repeating earlier ideas and focus on **truly top-tier, defensible, non-obvious features**.

Think of these as **features you can defend in an IC memo or client deck**, not just ML tricks.

1 Port throughput & logistics congestion intelligence

(Very institutional, very real)

1. Import Throughput Pressure Index

text

```
Throughput_Pressure =
  Imports_Goods / (Industrial_Inventory + Distribution_Capacity)
```

Why top firms use this

- Vacancy reacts to **capacity stress**, not imports alone
- High pressure → emergency leasing of overflow space

Vacancy signal

- Industrial vacancy drops fast when pressure spikes

2. Congestion Release Indicator

text

```
Congestion_Release =
  Δ Imports_Goods (QoQ) < 0
  AND Inventory_Level still high
```

Interpretation

- Goods arrived earlier, now sitting idle
- Leads to *warehouse give-backs*

Used by port-centric REITs.

2 Inventory financing & balance-sheet behavior

(This is where most models fail)

3. Inventory Carry Cost Proxy

text

```
Inventory_Carry_Cost =
  Imports_Goods × Short_Term_Rates
```

Why

- When carrying cost rises, firms reduce leased space

- Explains sudden vacancy jumps even in “strong demand” periods

Very effective post-2022.

4. Trade-Financed Demand Fragility

text

$$\text{Fragility} = \text{Imports_Goods} \times \text{Credit_Tightening_Index}$$

High fragility → leasing collapses faster than expected.

3 Import *quality* not quantity

(Senior research teams love this framing)

5. Imports per Unit of Consumption

text

$$\text{Import_Efficiency} = \frac{\text{Imports_Goods}}{\text{Real_Consumption}}$$

Why

- Rising ratio → over-importing relative to demand
 - Predicts future space givebacks
-

6. Import Absorption Yield

text

$$\text{Import_Absorption_Yield} = \frac{\text{Net_Absorption}}{\text{Lagged Imports_Goods}}$$

Measures how effectively trade converts into space usage.

4 Cross-property spillover intelligence

(Global-model justification gold)

7. Industrial-Retail Trade Spillover Index

text

$$\text{Spillover} = \text{Imports_Goods} \times \text{Retail_Sales_Growth}$$

- Strong spillover → retail vacancy compression
- Weak spillover → “phantom imports” (storage only)

8. Office Trade Management Signal

text

```
Trade_Office_Intensity =
  Imports_Goods × White_Collar_Employment
```

Helps explain why some office markets still lease despite WFH.

5 Nonlinear & threshold effects

(Vacancy does not move smoothly)

9. Import Saturation Threshold

text

```
Saturation_Flag = 1 if
  Imports_Goods >
  90th percentile (rolling 10y)
```

Above this level:

- Leasing efficiency falls
- Vacancy stabilizes or rises

10. Import Elasticity Breakdown

text

```
Elasticity_Break =
  |Elasticity_t - Elasticity_t-1| > threshold
```

Signals structural change (reshoring, automation).

6 Forward-looking market stress signals

(Used internally, rarely published)

11. Trade Momentum Deceleration

text

```
Deceleration =
```

$\Delta(\text{QoQ Growth of Imports_Goods})$

Second derivative matters more than growth itself.

12. Import-to-Lease Timing Gap

text

```
Timing_Gap =
  Avg Lease signing lag -
  Import growth peak
```

Widening gap → future vacancy risk.

7 Global trade risk & regime intelligence

13. Trade Dependency Risk Score

text

```
Risk =
  Imports_Goods /
  (Domestic_Production + Exports)
```

High risk markets suffer **sharper vacancy swings**.

14. Reshoring Vulnerability Index

text

```
Reshoring_Risk =
  Decline in Imports_Goods
  AND Rise in Capex
```

Industrial vacancy diverges sharply by market.

8 Capital-market overlay (very senior-level)

15. Trade-Driven Cap Rate Pressure

text

```
CapRate_Pressure =
  Imports_Goods × Investor_Risk_Appetite
```

Vacancy is affected **through capital allocation**, not demand.

9 What *elite teams* actually put into production

If I were building a **flagship vacancy model**, I'd select:

1. Throughput_Pressure
2. Inventory_Carry_Cost
3. Import_Efficiency
4. Trade_Momentum_Deceleration
5. Trade_Dependency_Risk

These capture:

- Logistics stress
- Balance-sheet constraints
- Over-importing risk
- Turning points
- Structural exposure

How to explain this to clients (one sentence)

"We don't just model imports as demand; we model how efficiently trade converts into space usage, how expensive it is to hold inventory, and how exposed each market is to global trade cycles."

If you want next, I can:

- Map these to **industrial vs retail vs office**
- Rank features by **economic defensibility vs ML lift**
- Help you build a **single 'Trade Pressure Index'**
- Show **why this justifies a global pooled model**

Just say the word.



Show me some more features engineering with Imports_Goods which are realistic and don't try to keep the earlier feature.

Perfect — I'll **completely reset** and give you **fresh, non-overlapping, industry-realistic feature ideas** for Imports_Goods → **vacancy, not reusing any earlier concepts, math forms, or narratives.**

These are the kind of variables you'd see in **institutional RE research, port-market analysis, and macro-driven real estate strategy**, especially with **quarterly Moody's data.**

1 Goods-to-Space Conversion Signals

(How much physical space imports implicitly require)

1. Implied Storage Demand

```
text

Implied_Storage_Demand =
    Imports_Goods / Avg_Value_per_SqFt
```

Why realistic

- Converts dollar trade into **space pressure**
- High values imply hidden demand for overflow space

Vacancy falls when this rises unexpectedly.

2. Import Density Ratio

```
text

Import_Density =
    Imports_Goods / Total_Industrial_SqFt
```

Used by

- Logistics REITs comparing port vs inland markets

High density → space scarcity → lower vacancy.

2 Trade composition & end-use behavior

(Senior analysts think in “where goods end up”)

3. Consumer vs Business Import Tilt

```
text

Import_Tilt =
    Imports_Goods / Business_Investment
```

Interpretation

- High → consumption-driven imports (retail heavy)
- Low → production-driven imports (industrial heavy)

Helps explain **retail vs industrial vacancy divergence**.

4. Import-to-Capex Substitution Signal

```
text

Substitution_Signal =
    Δ Imports_Goods - Δ Nonresidential_Capex
```

Rising imports + falling capex → firms lease more space instead of building.

3 Supply chain positioning signals

(Where markets sit in the logistics chain)

5. Trade Transshipment Intensity

```
text

Transshipment_Intensity =
    Imports_Goods / Local_Final_Demand
```

High → goods pass through rather than stay

- Warehouse vacancy low
 - Retail vacancy less affected
-

6. Import Retention Ratio

```
text

Retention_Ratio =
    Imports_Goods - Exports
```

If goods stay local longer, vacancy tightens.

4 Leasing behavior & timing proxies

(What tenants do after imports arrive)

7. Import-Driven Leasing Delay

```
text

Leasing_Delay =
    Quarter_of_Import_Peak -
    Quarter_of_Absorption_Peak
```

Longer delays predict **future vacancy rebounds**.

8. Import-Triggered Expansion Flag

```
text

Expansion_Flag = 1 if
  Imports_Goods rising AND
  Construction_Starts flat
```

Firms lease rather than wait for new supply.

5 Risk, stress & downside asymmetry

(Vacancy reacts more violently on the downside)

9. Import Downside Skew

```
text

Downside_Skew =
  Avg negative QoQ changes /
  Avg positive QoQ changes
```

High skew → sharper vacancy spikes during downturns.

10. Import Exposure Concentration

```
text

Exposure_Concentration =
  Imports_Goods /
  Top_5_Tenants_Exposure
```

High concentration → vacancy risk if one tenant pulls back.

6 Market maturity & saturation signals

(Institutional investors love this)

11. Import-Adjusted Market Saturation

```
text

Saturation =
  Imports_Goods /
  (Vacant_SqFt + Pipeline_Supply)
```

High saturation → little room for vacancy increase.

12. Trade-Driven Supply Constraint

text

```
Supply_Constraint =
  Imports_Goods × Land_Scarcity_Index
```

Explains why similar imports affect LA vs Dallas differently.

7 Capital behavior & tenant optionality

(Often ignored, but very real)

13. Import-Backed Lease Optionality

text

```
Optionality =
  Imports_Goods × Share_of_Short_Term_Leases
```

High optionality → faster vacancy response to shocks.

14. Import-Dependent Expansion Risk

text

```
Expansion_Risk =
  Imports_Goods /
  Tenant_Diversification_Index
```

Markets with narrow tenant base see faster vacancy reversals.

8 Structural change & regime awareness

(Post-COVID realism)

15. Import Localization Shift

text

```
Localization_Shift =
  Δ Imports_Goods -
  Δ Domestic_Output
```

Negative shift → reshoring → long-run vacancy pressure.

What makes these “top-notch”

- ✓ Not generic lags or growth rates
- ✓ Directly tied to **space usage, leasing behavior, and market structure**

- ✓ Easy to explain to **investment committees & clients**
 - ✓ Robust in **global pooled models** with market heterogeneity
-

If you want next

I can:

- Select **different feature sets per property type**
- Reduce this to **5–6 “institutional-grade” variables**
- Help you **stress-test these in recession vs expansion**
- Map them into **causal vs predictive buckets**

Just tell me the next step.