MOODY'S

The Macroeconomic Consequences of a Category 5 Miami Hurricane

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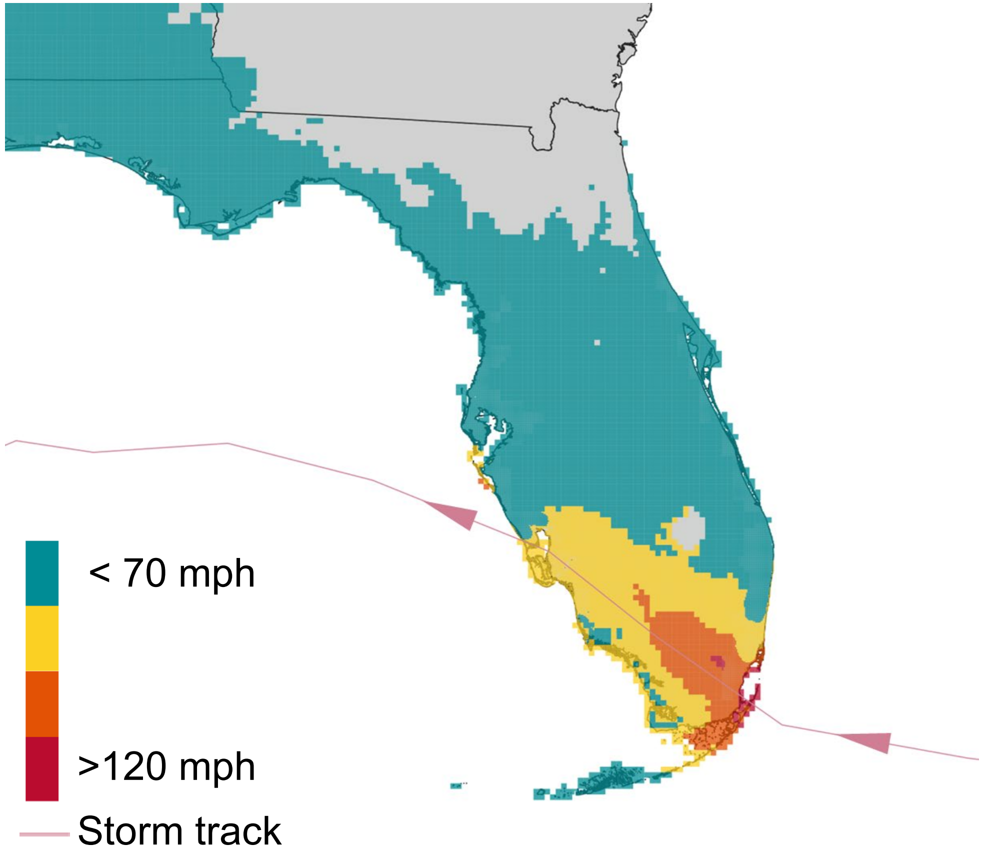
Natural Catastrophe Modeling

How Moody’s Analytics Models Catastrophe Risk

DEFINE PERIL	APPLY EXPOSURE	ASSESS HAZARD	CALCULATE DAMAGE	QUANTIFY LOSS
STOCHASTIC EVENT MODULE	EXPOSURE DATABASE	HAZARD MODULE	VULNERABILITY MODULE	FINANCIAL MODULE

Source: Moody’s Analytics

A Katrina-Sized Hurricane

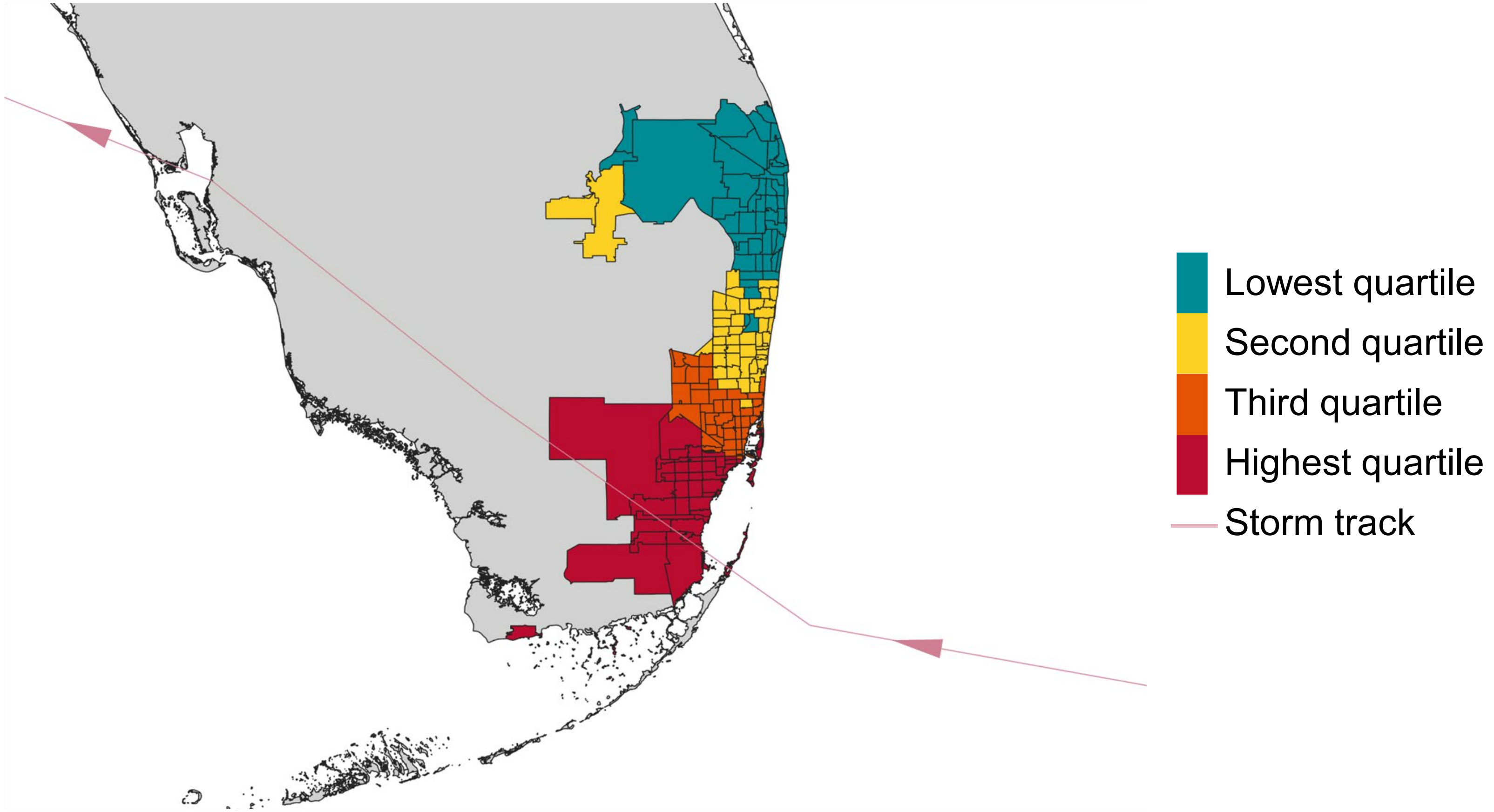


Storm category (Saffir-Simpson scale)	Category 5
Location of landfall	Homestead FL
Modeled loss in the tri-county area	$212 bil
Modeled loss caused by extreme wind	$196 bil
Modeled loss caused by flooding	$16 bil
Modeled insured loss in the tri-county area	$114 bil
Proportion of modeled losses insured	54%

Source: Moody's Analytics

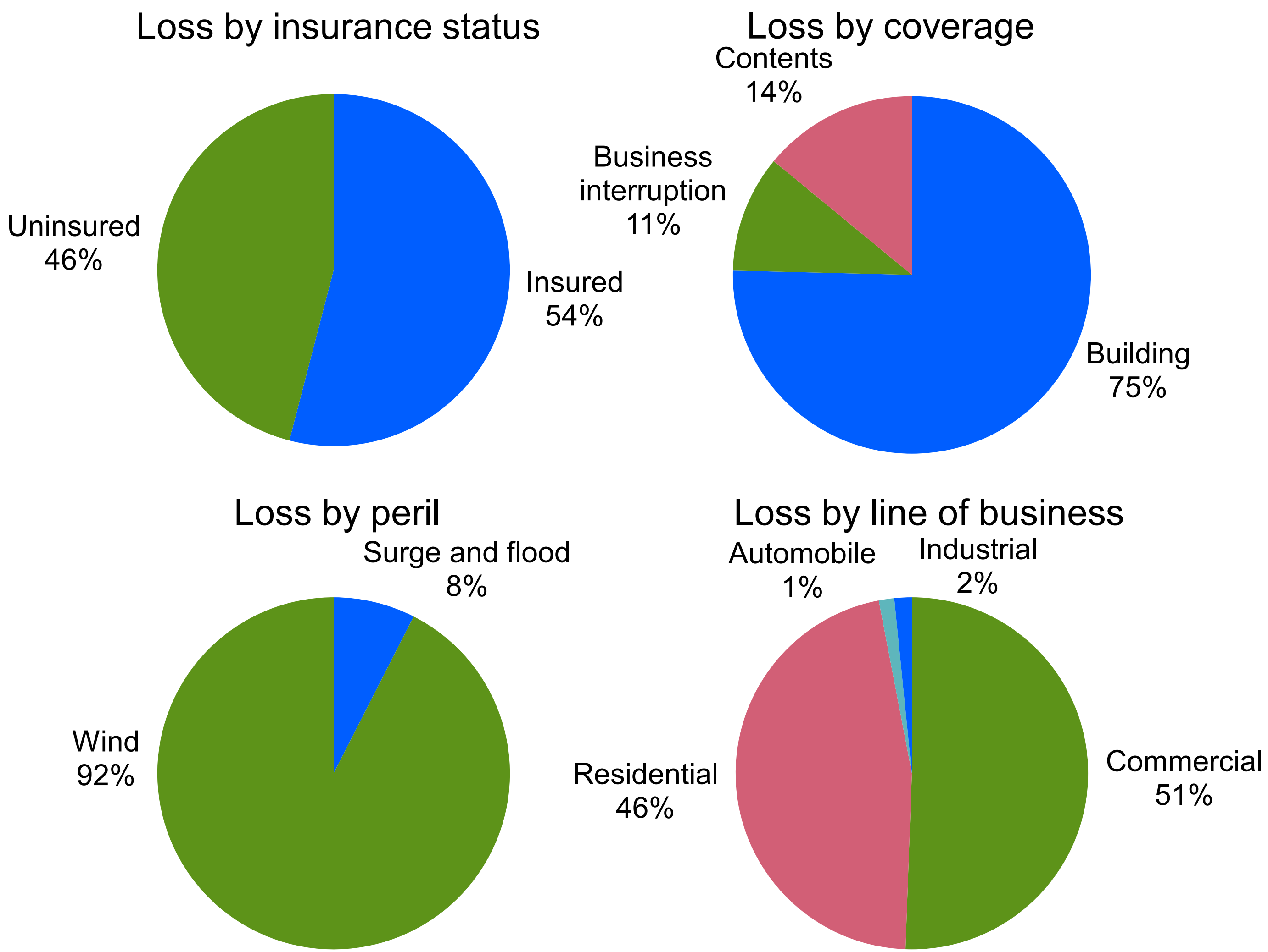
Miami Is at the Epicenter

Property damage normalized to exposure by ZIP code



Source: Moody's Analytics

Most of the Damages Are to Buildings Resulting From High Winds



Source: Moody’s Analytics

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Policy Response and Insurance Market Assumptions

No Supplemental Appropriations in the Severe Scenario

$ bil

Moderate scenario		Severe scenario	
Supplemental legislation		**Supplemental legislation**	
FEMA	60.7	FEMA	0
Public Assistance Program (PAP)	28.5	Public Assistance Program (PAP)	0
Individual Assistance Program (IAP)	15.2	Individual Assistance Program (IAP)	0
Hazard Mitigation Grant Program (HMGP)	3.6	Hazard Mitigation Grant Program (HMGP)	0
Other FEMA	13.4	Other FEMA	0
Housing and Urban Development (HUD)	27.0	Housing and Urban Development (HUD)	0
Army Corps of Engineers (ACE)	14.8	Army Corps of Engineers (ACE)	0
Other	32.4	Other	0
Total	134.9	Total	0
Mandatory spending		**Mandatory spending**	
NFIP	8.6	NFIP	8.6
D-SNAP	0.4	D-SNAP	0.4
UI Claims	0.5	UI Claims	0.5
Total	9.4	Total	9.4
Total	144.4	Total	9.4

Notes:
Estimates for the moderate scenario are on par with the federal government's response to Hurricane Katrina.

Source: Moody's Analytics

FHCF, Not Citizens, Provides Assessment Risk

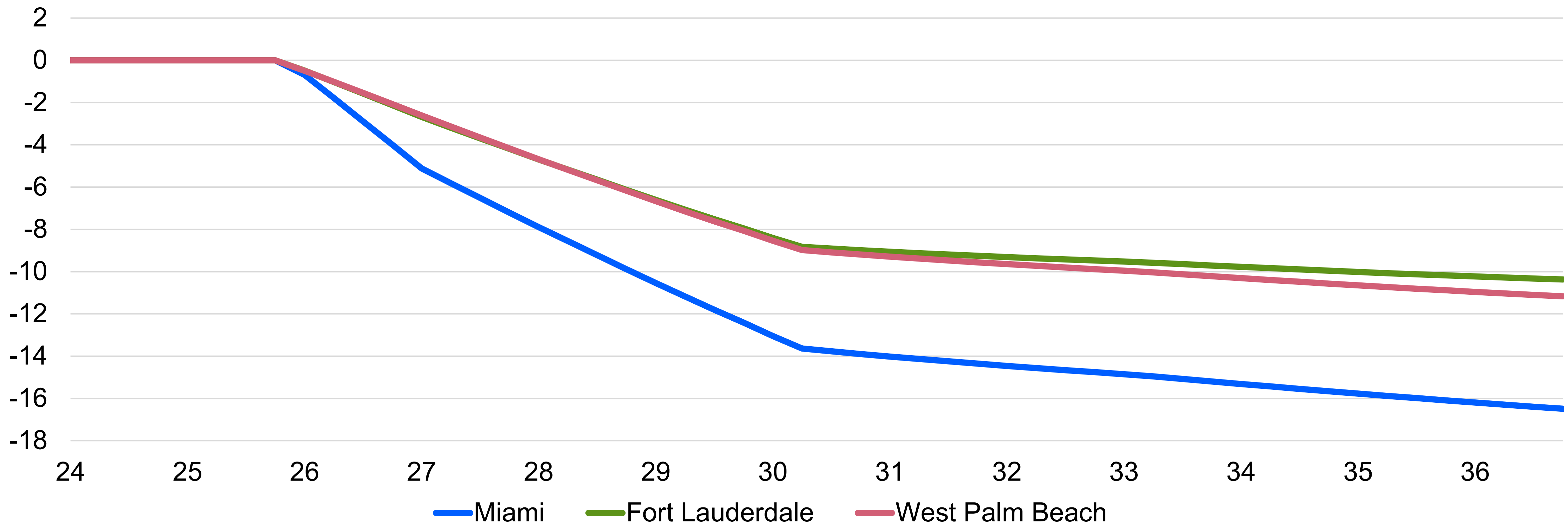
$ bil

FHCF obligations and liquidity resources - 2024-2025 contract yr	Amount
Total potential FHCF obligations - commercial and residential	17.0
Projected 2024 year-end fund balance	6.9
Series 2020A pre-event bonds balance	2.3
Series 2024A pre-event bonds balance	1.0
Total liquidity resources	10.2
Total liquidity resources below potential obligations	6.8

Sources: FHCF bonding capacity report, Moody's Analytics

Three Key Channels Drive Housing Values Lower

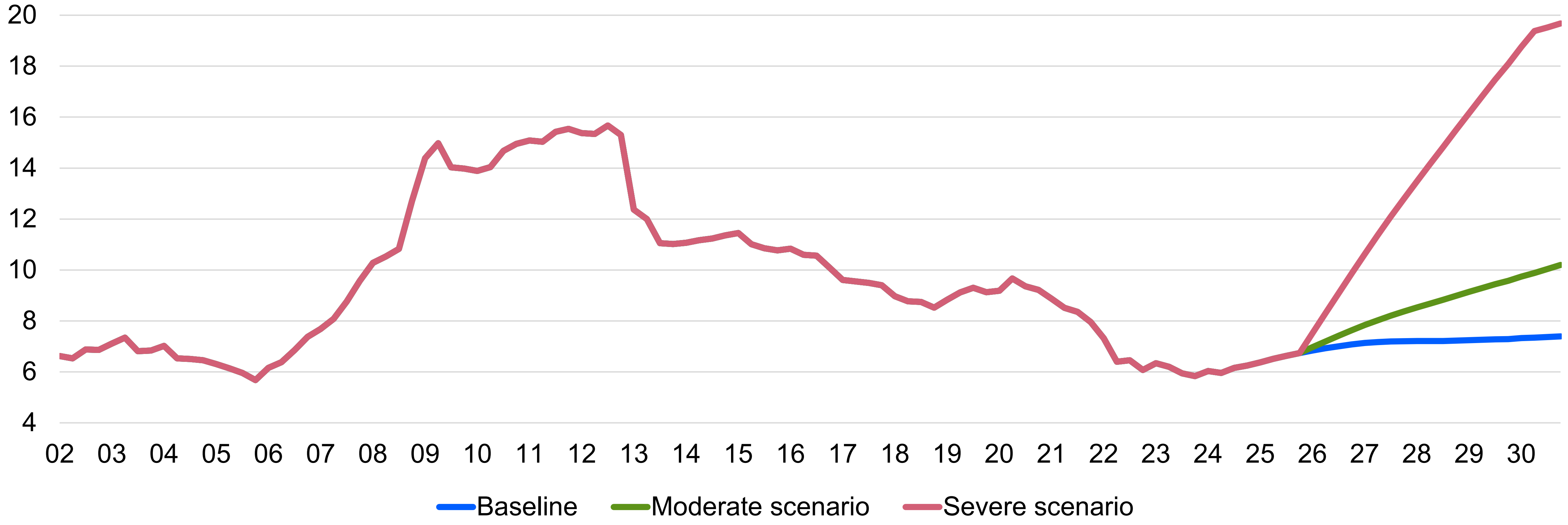
FHFA house price index, Southeast Florida hurricane severe scenario, % decline from baseline



Source: Moody's Analytics

Higher Housing Costs Mean Lower Housing Prices

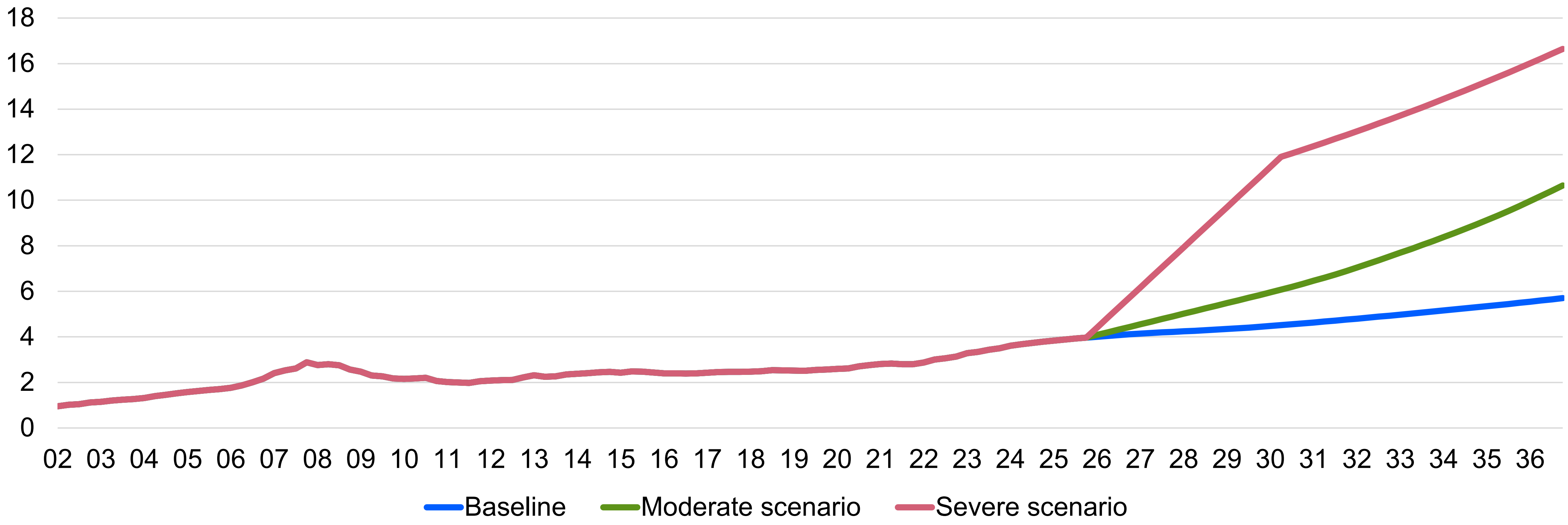
Homeowners insurance percentage of operating and maintaining a home, Miami, %



Sources: ACS, CES, NAR, Moody's Analytics

The Insurance Market Is Stressed in Both Scenarios

Annual premium for homeowners insurance, Florida, $ ths



Sources: ACS, Moody's Analytics

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Economic Implications

How Hurricanes Harm Regional Economies

Physical damage

- Destroyed or damaged property
- Corresponds with insured losses
- Accounts for most of the cost

Lost output

- Reduced productive capacity
- Can be temporary or permanent
- Reflects evacuations, out-migration, power outages, etc.

Source: Moody's Analytics

Translating Assumptions Into Forecasts

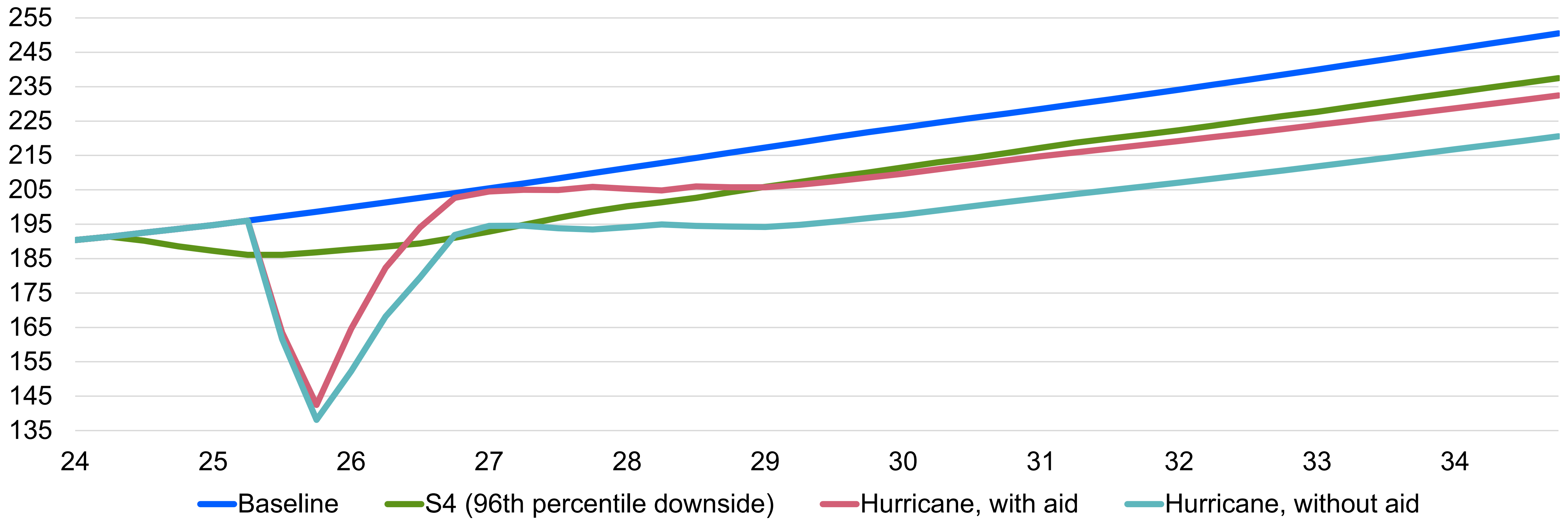
- RMS damage estimates were translated into lost output based on historical ratio.
- Time paths were calculated based on the timing of and recovery from Hurricane Katrina in New Orleans. Storm is assumed to hit in the third quarter of 2025, but that is largely irrelevant.

- Typical top-down approach is better-suited to macroeconomic shocks that need to be translated to regions. Forecasts, both with and without government aid, are created based loosely on existing methodology for Moody's climate scenarios.
- Start by translating lost output to GDP forecasts, allocating to Miami-Dade, Broward, and Palm Beach counties based on severity of storm in each.
- Use historical relationship between GDP and employment to generate labor market paths. Where necessary, alter specific industries such as construction.
- Reduce nonwage income to reflect the impact of assessments from the FHCF; adjust homebuilding and prices based on builders' and insurers' responses.
- Solve the model to endogenously determine the remaining forecasts.

Source: Moody's Analytics

Near-Term Impacts Are Massive

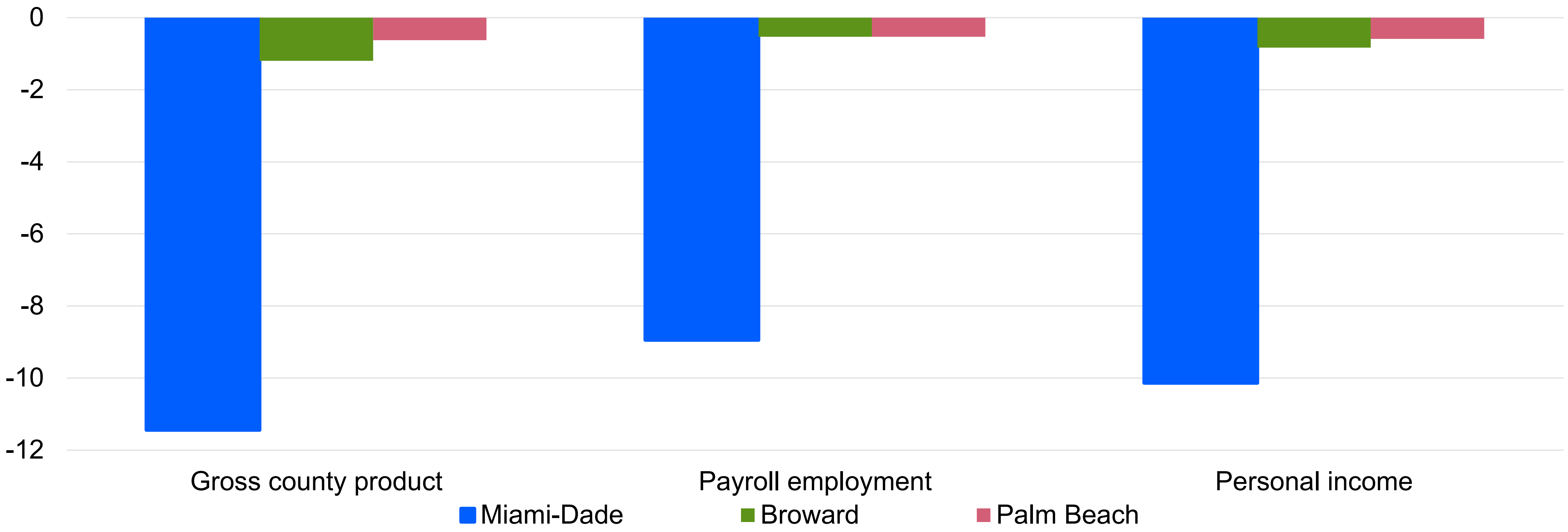
Gross metro product, Miami-Dade County, $ bil ch. 2017



Sources: BEA, Moody's Analytics

Miami-Dade Is Hurt Most by a Direct Hit

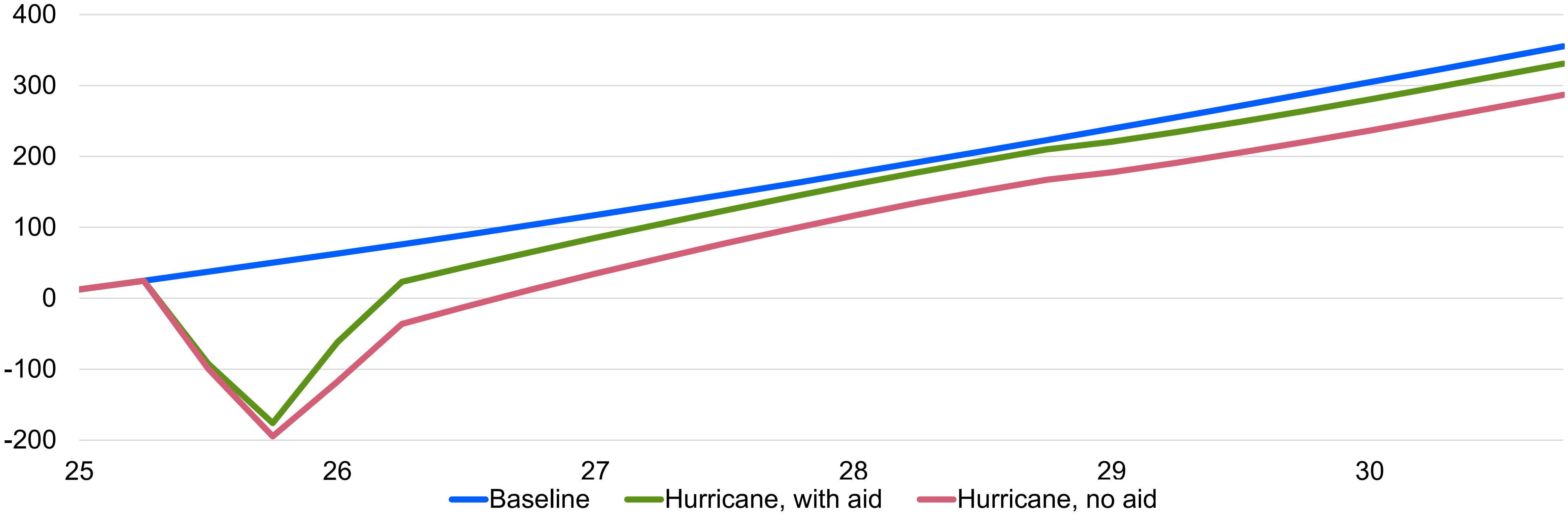
Avg from 2025-2029, % change from 2024, difference between no federal aid scenario and baseline



Sources: BLS, BEA, Moody's Analytics

Sharp Population Decline Requires Aid to Overcome

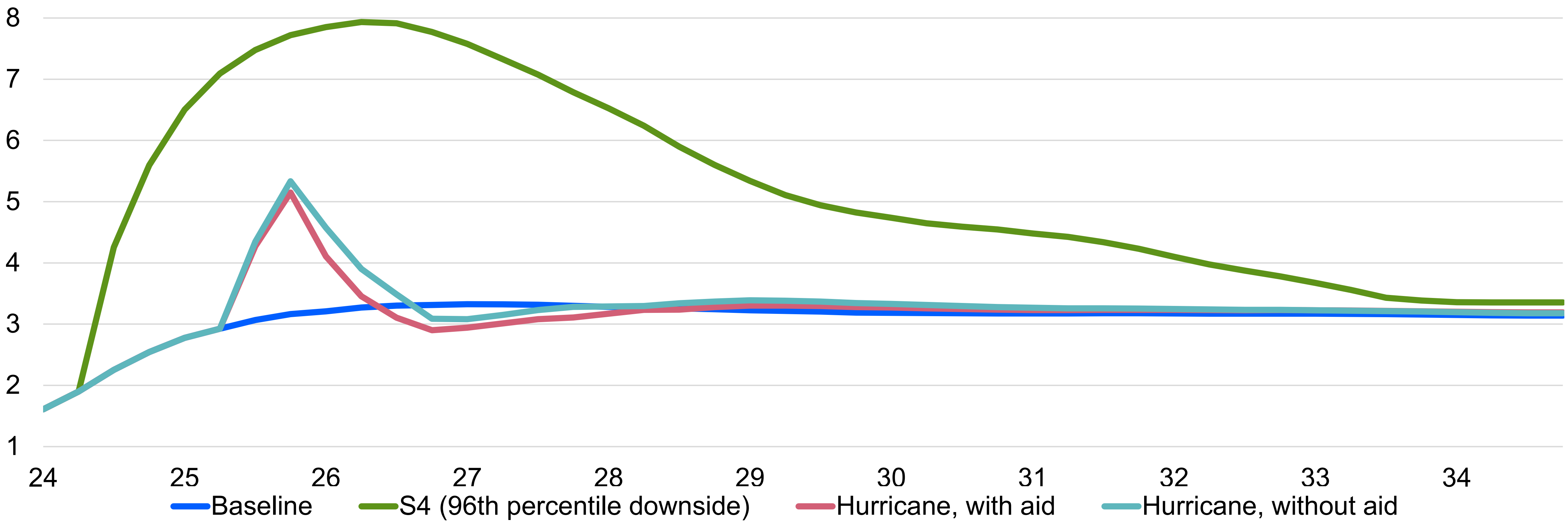
Cumulative net migration, Miami-Dade County, starting in 2025Q1, ths



Sources: BEA, Moody's Analytics

Shrinking Labor Force Mutes Unemployment Rate Shock

Unemployment rate for Miami-Dade County, SA, %



Sources: BLS, Moody's Analytics

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