Oahu MPO FARES Model Briefing

Agenda

- Context on for Study
- Guiding Assumptions
- Review two models & validation tool used to develop Baseline ridership & fare revenue scenario.
- Discuss key model assumptions

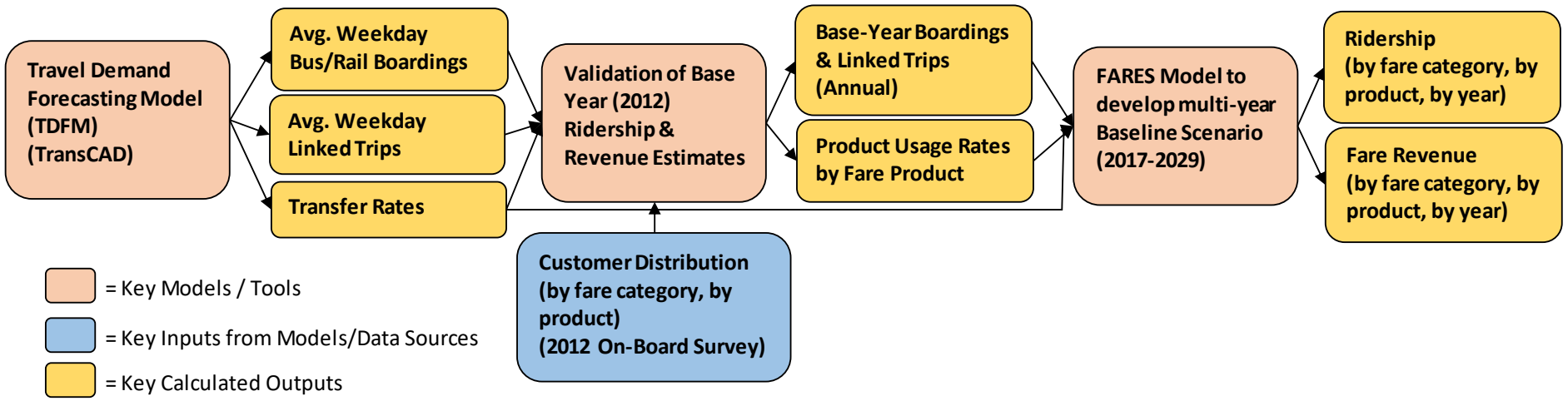
FARES Model Context

- Study began in summer 2016 with originally anticipated completion in early 2017
- Use integrated Regional Transportation Model estimates and microeconomic FARES model to evaluate potential rail and bus fares and resultant farebox recovery rates
  - Five scenarios were originally to be considered
- Present to the HART PIG responsible for providing council with rail fare and farebox recovery recommendations
- Have a model that could be used by the region to evaluate impacts of fares on transit ridership

Study Assumptions

Goal	Fare Policy Objectives
Simplicity	With base functionality in place, effectively use the electronic fare collection system to simplify the fare structure and make fares easy to understand and pay
Ridership	Use fare system data to strengthen service planning and fare policy decisions Benefit society by encouraging transit use and increasing transit's share of the region's transportation market
Revenue	Link fares to the value of the service to customers, considering trip length, service quality and market demand Implement regular fare policy reviews and periodic fare adjustments, to generate sufficient fare revenue Define sustainable group discount programs that attract riders
Equity	Offer equitable fares that recognize the needs and ability to pay of passengers who depend on transit for their mobility needs
Cost Control	Quickly migrate customer fare payment to electronic fare collection system

Overarching Model Framework



- Approach relies on two models & validation tool
  - Travel Demand Forecasting Model (TDFM, TransCAD) to estimate weekday boardings and linked trips in specific years
  - Validation tool to convert TDFM model results into annual boardings and linked trips by fare category and fare product, in 2012
  - FARES model to evaluate multi-year scenarios from 2017-2029

Travel Demand Forecasting Model

- TDFM Relies on TransCAD 6.0 software, originally developed for OahuMPO Regional Transportation Plan 2040, updated for this modeling effort
  - Simulates individual daily travel patterns, linked together as a series of trips
  - Supplemented with data on tourist, airport passenger & commercial vehicle traffic
  - Key updates include land use changes (to reflect shorter planning timeframe), some road network differences.
- Use of the TransCAD 6.0 micro-simulation model system brings key benefits
  - Official regional model – Consistency between MPO, transportation modeling efforts
  - Supports use of FARES model for detailed fare policy analysis

Travel Demand Forecasting Model

- TDFM Model Runs
  - 2012 Scenario – For calibration of FARES model inputs/assumptions
  - 2019 Pre-Opening Scenario – Ridership in final year before launch
  - 2020 Partial-Open Scenario – Capture addition of rail to Aloha Stadium
  - 2025 Full-Open Scenario – Determine benefits of rail to Ala Moana

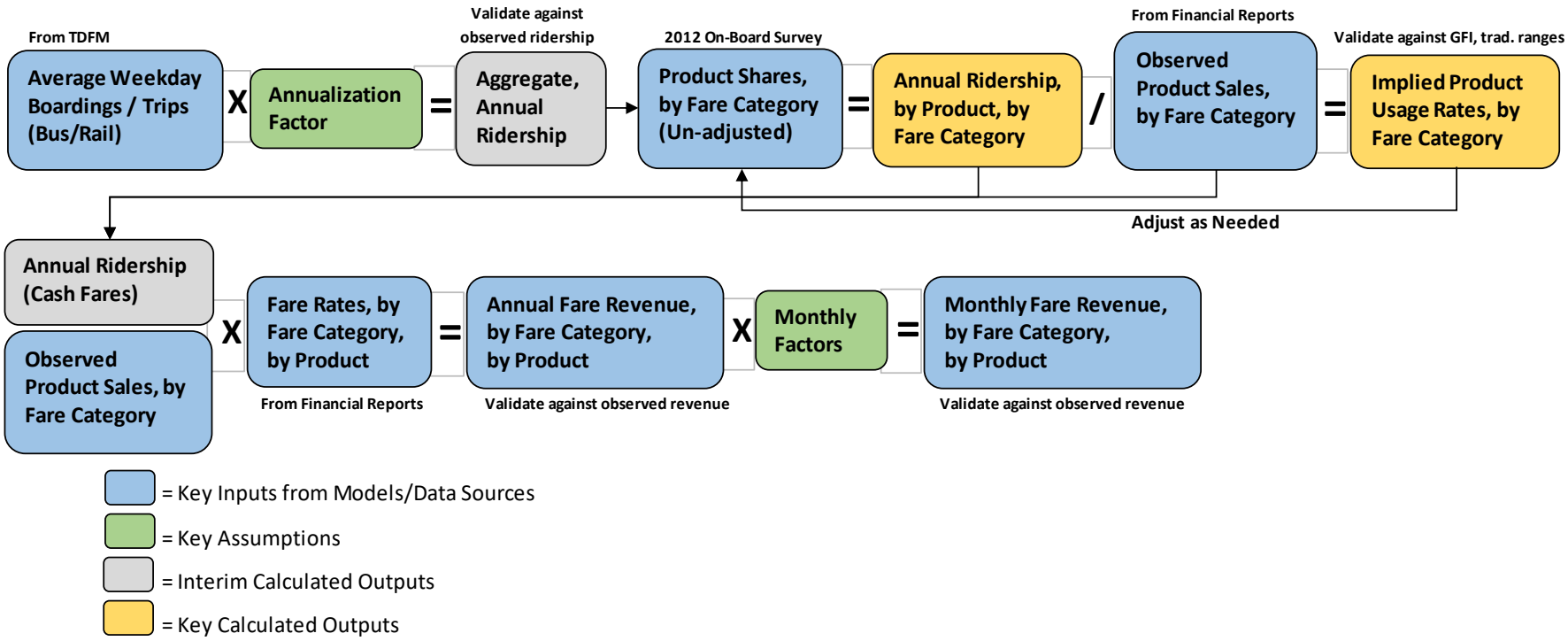
Model Scenario	2012 Calibrated Model	2019 Pre-Opening Model	2020 Partial-Opening Model	2025 Full-Opening Model
Major Inputs / Assumptions				
Bus Transit Network	2012 Network	2012 Network	2012 Network, w 53X	2030 FEIS Transit Network - Ferry removed
Rail Transit Network	N/A	N/A	Partial-Open, Aloha Stadium	Full-Open, Ala Moana Center
Rail Headways	N/A	N/A	15 min, all day	6 min peak, 12 min offpeak
Rail Speeds	N/A	N/A	POST FFGA 4-CAR	POST FFGA 4-CAR
Non-included attributes (NIA)	N/A	N/A	Half	Half
Roadway Network	2012 Hwy Network	2016 RTP, 'Short-Range'	2016 RTP, 'Short-Range'	2016 RTP, 'Short-Range'
Land Use Inputs	2012 Land Use	2020 Land Use, ver 11/30/15	2020 Land Use, ver 11/30/15	2020 Land Use, ver 11/30/15
Population	948,239	1,010,442	1,010,442	1,010,442
Employment	568,709	604,221	604,221	604,221
Households	314,775	335,829	335,829	335,829
Model Results (Average Weekday Boardings)				
Bus Boardings	216,461	234,874	243,054	300,377
Rail Boardings	-	-	12,053	97,085
Transit Boardings	216,461	234,874	255,107	397,462
Transit Trips	184,968	199,956	213,265	285,298
Transfer Rate	1.17	1.17	1.20	1.39

Travel Demand Forecasting Model

- Differences in TDFM outputs vs. previous modeling efforts
  - Lower Modeled Transfer Rate
    - In combination with FARES model approach, results in a change compared to historic revenue forecasts

- TDFM Outputs used in Validation/FARES Modeling
  - Avg. Weekday Boardings (by Mode)
  - Avg. Weekday Linked Trips
  - Transfer Rates

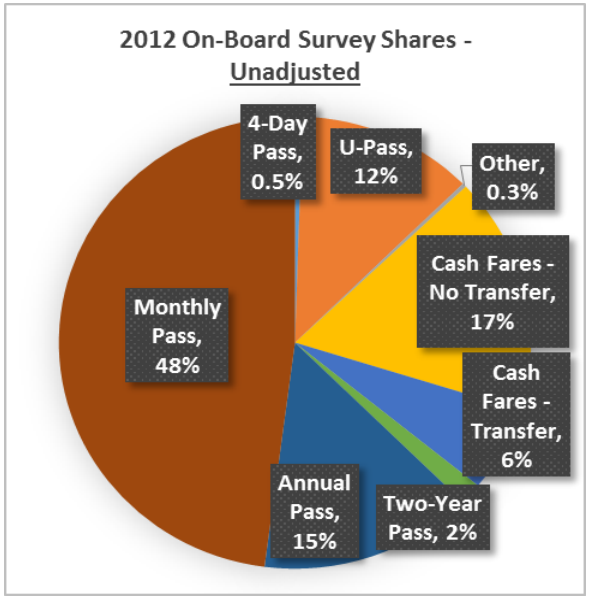
Base-Year Validation (2012)

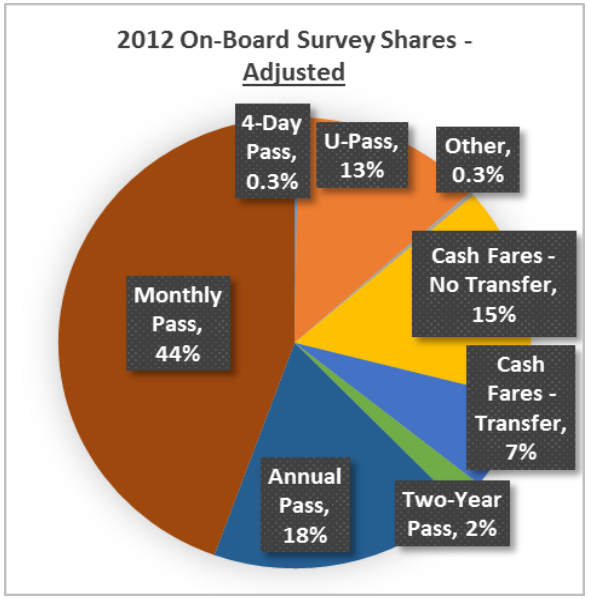


- Validation tool used to convert Avg. Weekday Boardings into Annual Boardings & Revenue by fare category, by fare product
  - Validate against observed/historic data at multiple steps

Base-Year Validation (2012)

- Major Assumptions in the Base-Year Validation
  - Annualization Factor (calculated in 2012) converting Avg. Weekday to Annual is assumed to remain constant in 2019, 2020, 2025
  - Product Shares by Fare Category (post-adjustment) are assumed to remain constant between Base-Year (2012) and initial model year (2017)
    - In reality, we know that 4-Day Pass & Opt-In Upass shares have shrunk due to pricing changes
    - Major adjustment was Adult, Monthly Pass share decreases / Senior, Annual Pass share increases

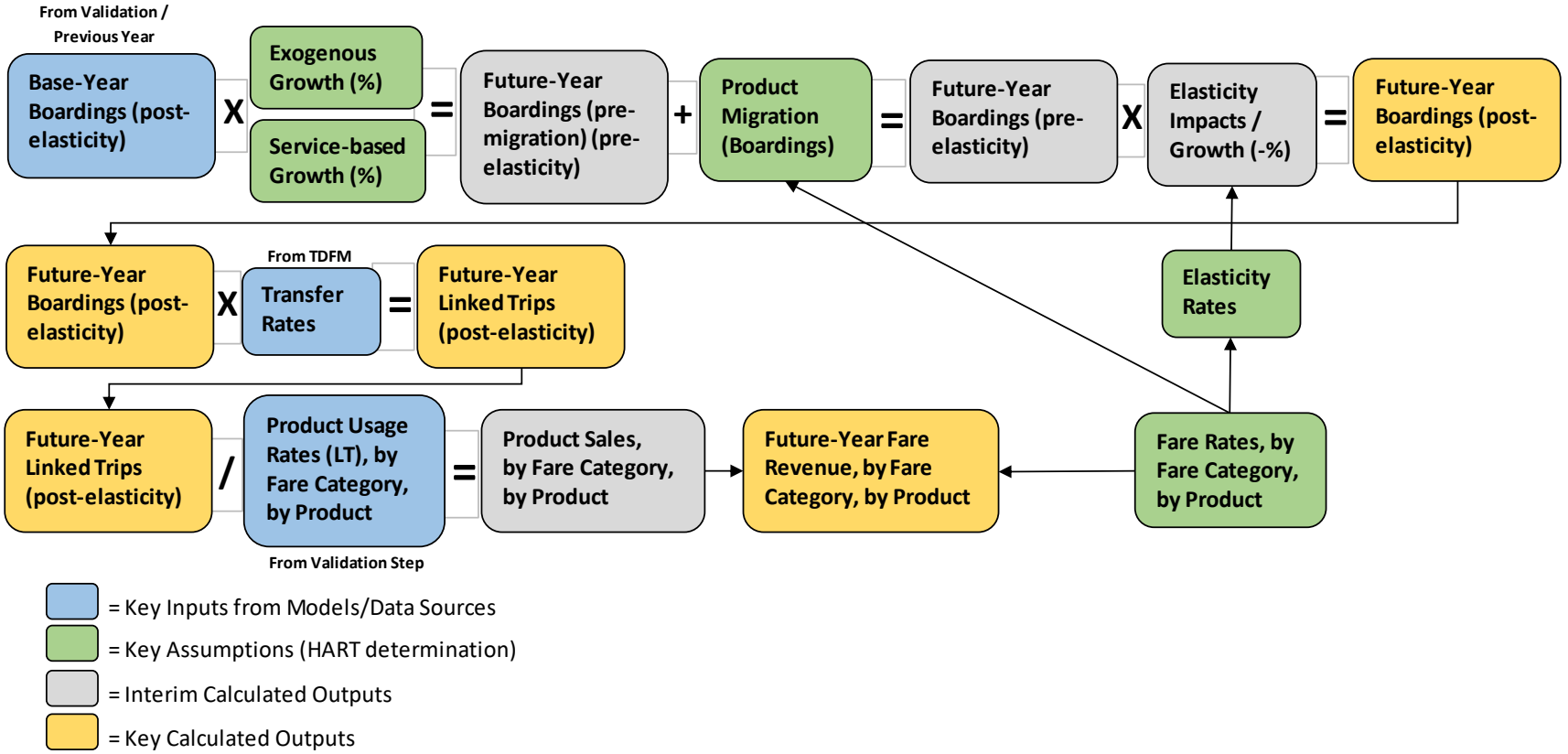




Base-Year Validation (2012)

- Key Outputs from Validation
  - Ridership Share by Fare Category, Fare Product (as determined by adjusted Product Shares by Fare Category)
  - Product Usage Rates by Fare Category, Fare Product

FARES Model



- FARES Model used to expand ridership point estimates (TDFM, 2012/2019/2020/2025) to Annual, Ridership & Fare Revenue estimates, 2017-2029
  - Additional assumptions are applied to generate unique scenarios

FARES Model

- Model Methodology Assumptions in FARES
  - Ridership Share by Fare Category, Fare Product assumed to remain constant in future years…unless price changes between products is asymmetrical*
    - i.e.: if all product prices increase by 2% across the board, no change in shares by fare category, fare product
    - i.e.: if pricing of Product A increases by a higher percentage than Product B, some ridership migration is assumed from Product A -> Product B (within same Category)
    - Model does NOT attempt to adjust fare category shares (eg: Adult, Senior) based on forecast demographic shifts.
  - Implied, Adjusted Product Usage Rates (calculated in the 2012 Validation) are assumed to remain constant in all future years
  - Transfer rates, as calculated in TDFM for 2012, 2019, 2020 & 2025, are assumed to remain constant in future years
    - e.g.: Transfer rate calculated in TDFM in 2020 assumed to remain constant from 2021-2024

FARES Model

- HART Universal Assumptions in FARES
  - Market-driven Growth
    - Assessment of future, region-specific growth factors outside of agency control.
  - Service-driven Growth
    - Assessment of future, operator-specific growth factors. Typically within operator control.
    - May be a variable assumption, subject to change across scenarios
  - Elasticity Rates
    - Developed assumptions earlier in model process. Sensitivity analysis to be performed.
  - Transfer Rates
    - Estimated in TDFM model, consistent across scenarios
  - Product Usage Rates
    - As noted earlier, assumed to remain constant across scenarios

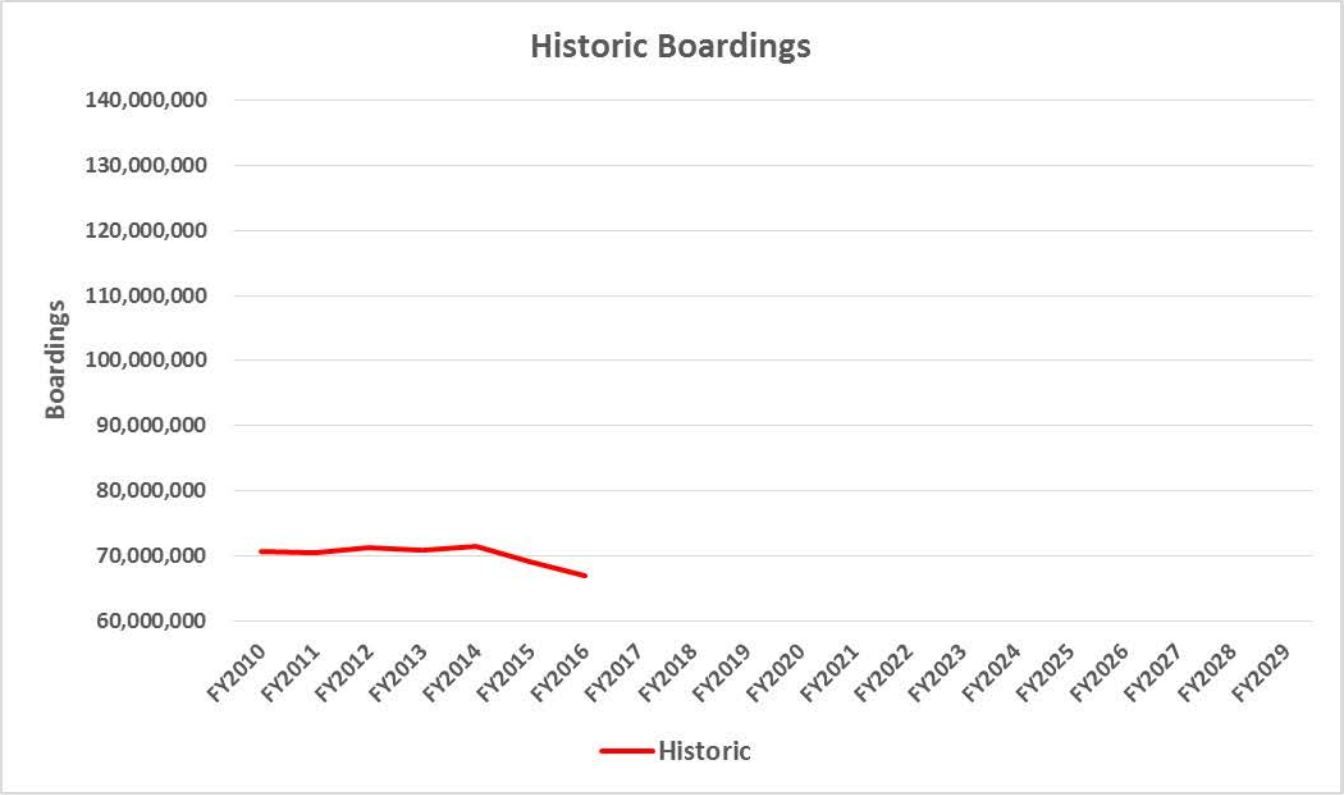
FARES Model

- HART Variable Assumptions in FARES
  - Fare Rates & Fare Products
    - Frequent variable for testing
  - Customer Product Migration
    - Migration driven by price differential between fare rates

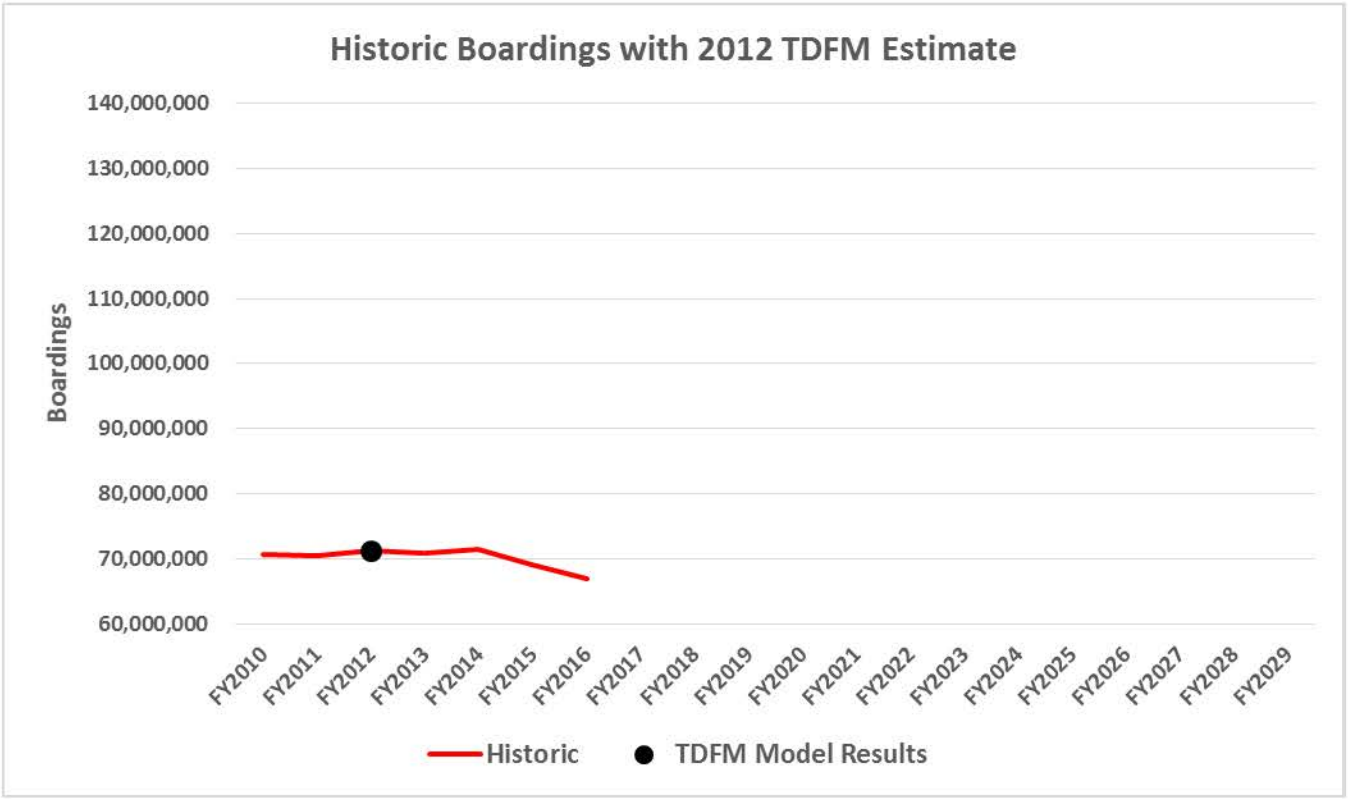
FARES Model

- Key Outputs from FARES Model
  - Ridership by Fare Category, by Fare Product (Annual & Monthly)
  - Fare Revenue by Fare Category, by Fare Product (Annual & Monthly)

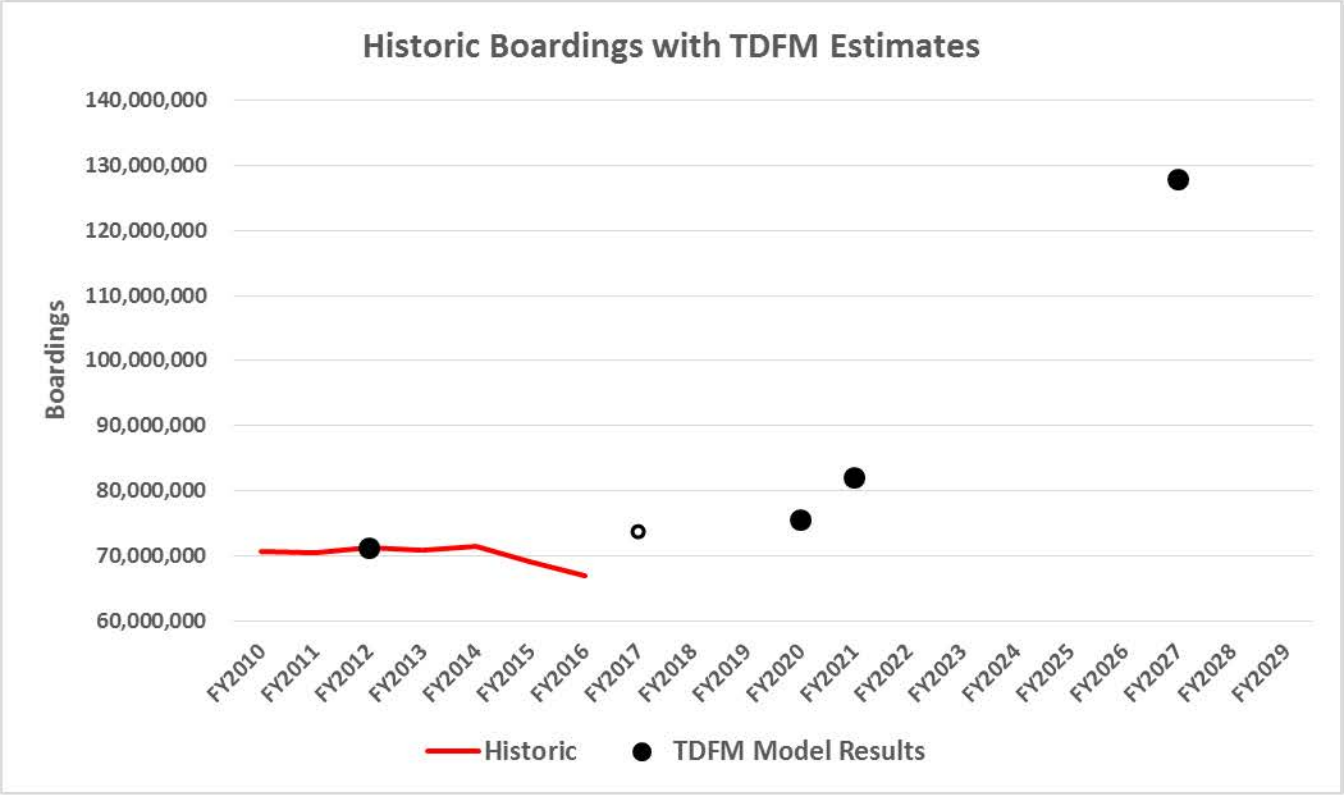
Start with Historic Data…



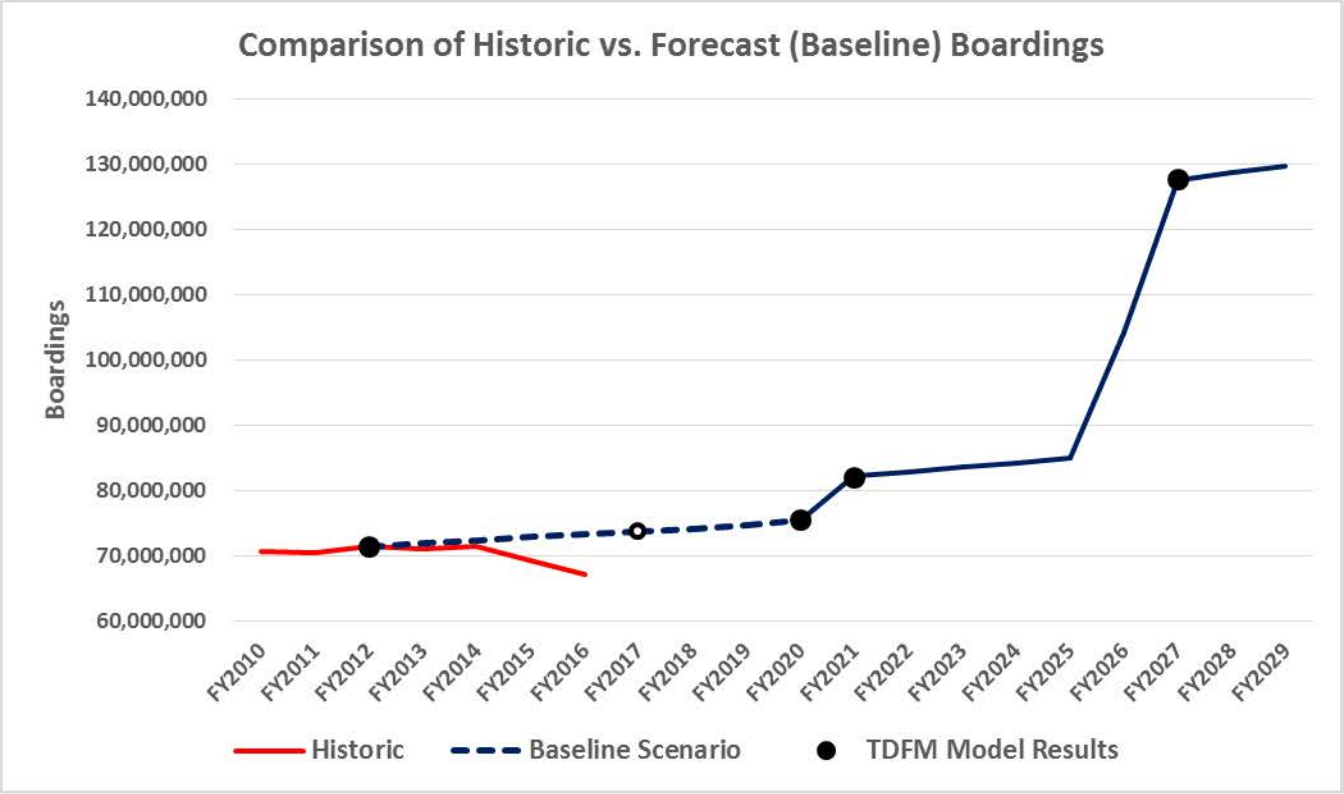
…validate 2012 TDFM estimates against Historic….



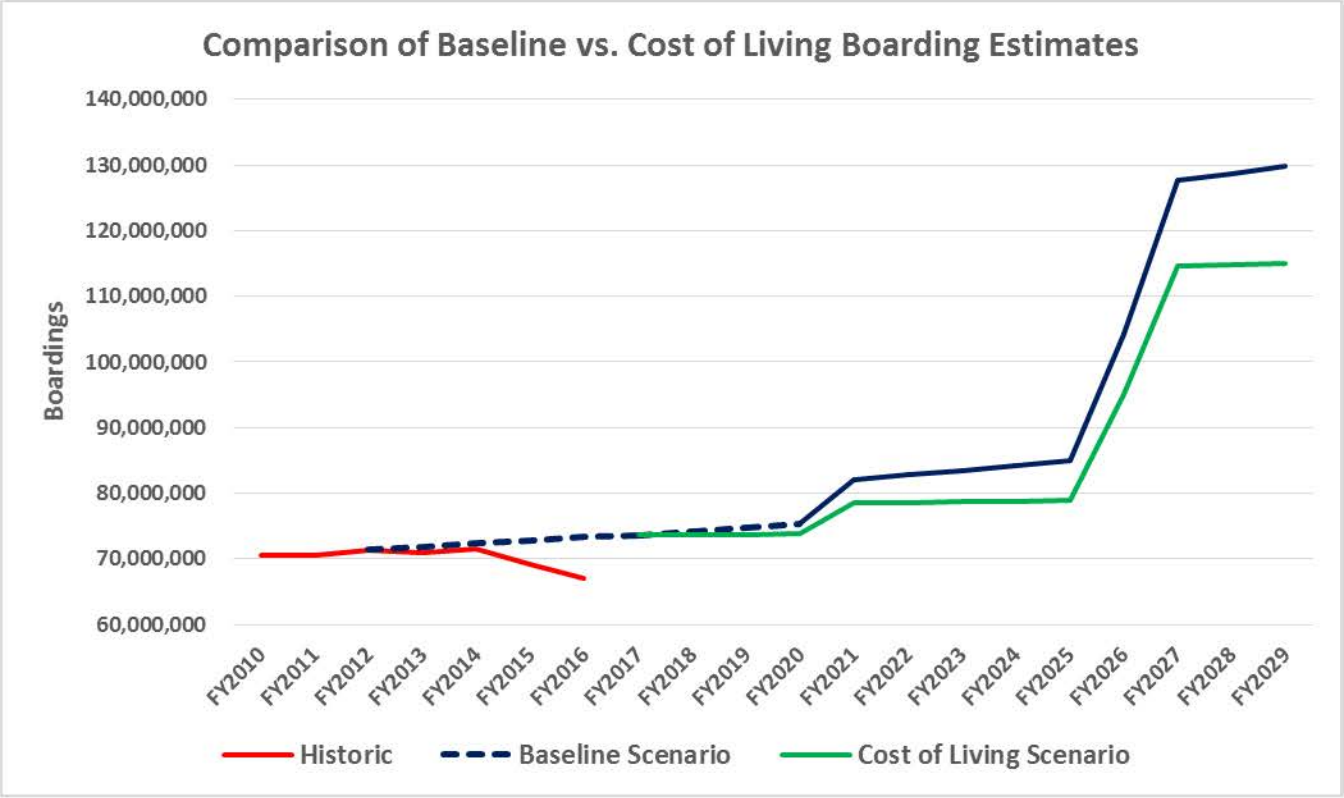
…expand validation assumptions to TDFM estimates…



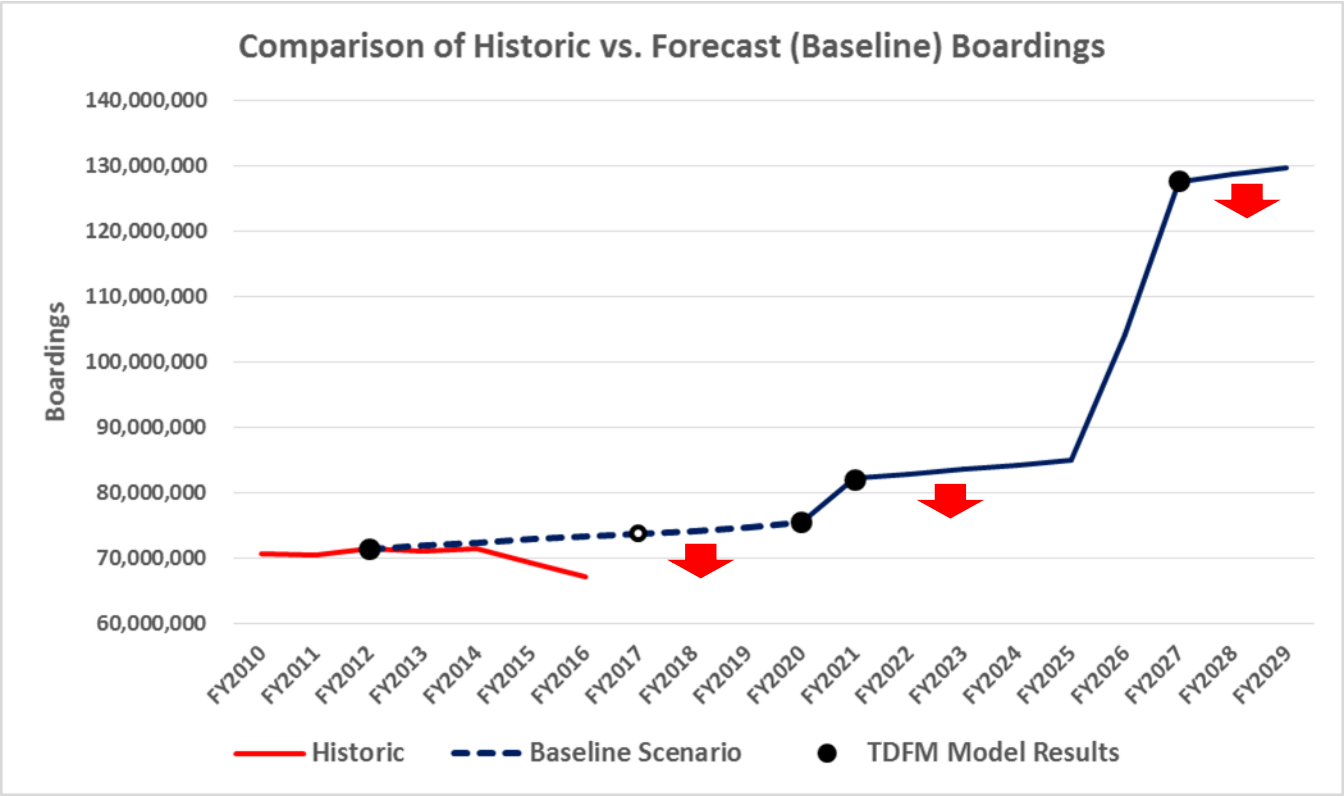
…use FARES Model to develop multi-year Baseline…



…and evaluate alternative fare scenarios.



Remaining Issues



- Alignment of FY2016 Observed vs. FY2017 Starting Point
  - Current assumptions result in overstated ridership & fare revenue for entire model period