



*Arab Monetary Fund  
6th Arab Regional Fintech Working Group  
November 24, 2021*

# **Machine Learning Challenges and Governance Aspects**

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# Agenda

1. Our Studies
2. Machine Learning Applications in Credit Risk
3. Benefits and Challenges of ML adoption
4. Machine Learning Governance Aspects and Controls

# Our Studies: Machine Learning Governance (2020)

66 firms\* participated in the IIF Machine Learning Governance survey, representing a diversity of scales, business models, and geographies.

A full analysis is available to participating firms and the official sector.



\* "Firms" represent banks and insurers. Firms are categorized by region according to where they are headquartered, while acknowledging that many have operations across multiple jurisdictions.

# Our Studies: Machine Learning in Credit Risk (2019)

60 firms \* (59 banks and 1 mortgage insurer) participated in the IIF Machine Learning in Credit Risk 2<sup>nd</sup> Edition survey



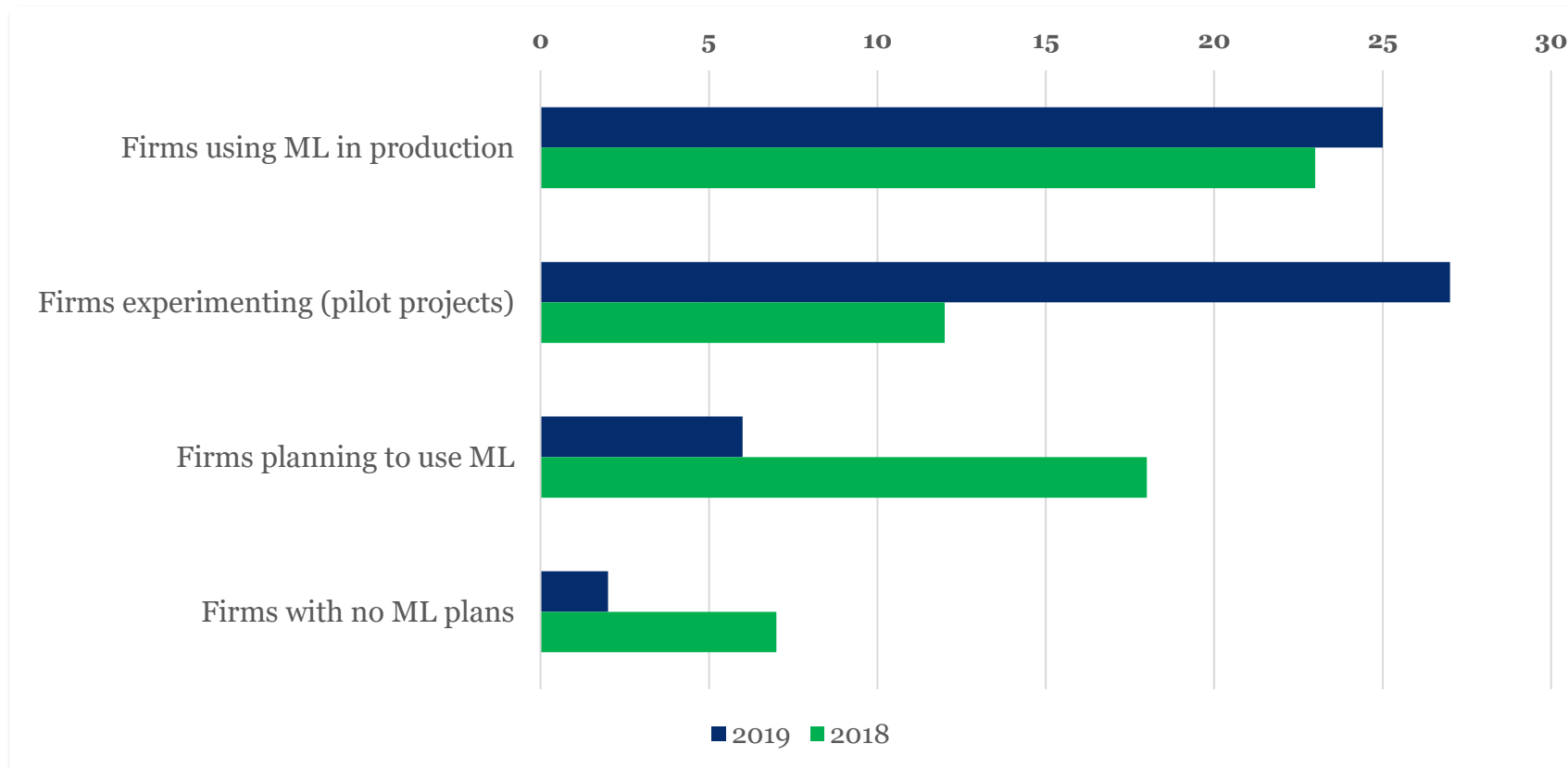
\* "Firms" represent banks and insurers. Firms are categorized by region according to where they are headquartered, while acknowledging that many have operations across multiple jurisdictions.

# Maturity of ML Applications in Credit Risk (2018-2019)

There was a 49% increase in the number of firms that either had ML models in production or active pilot projects.

Within the “pilot projects” group, we see an incredible 125% surge year-over-year.

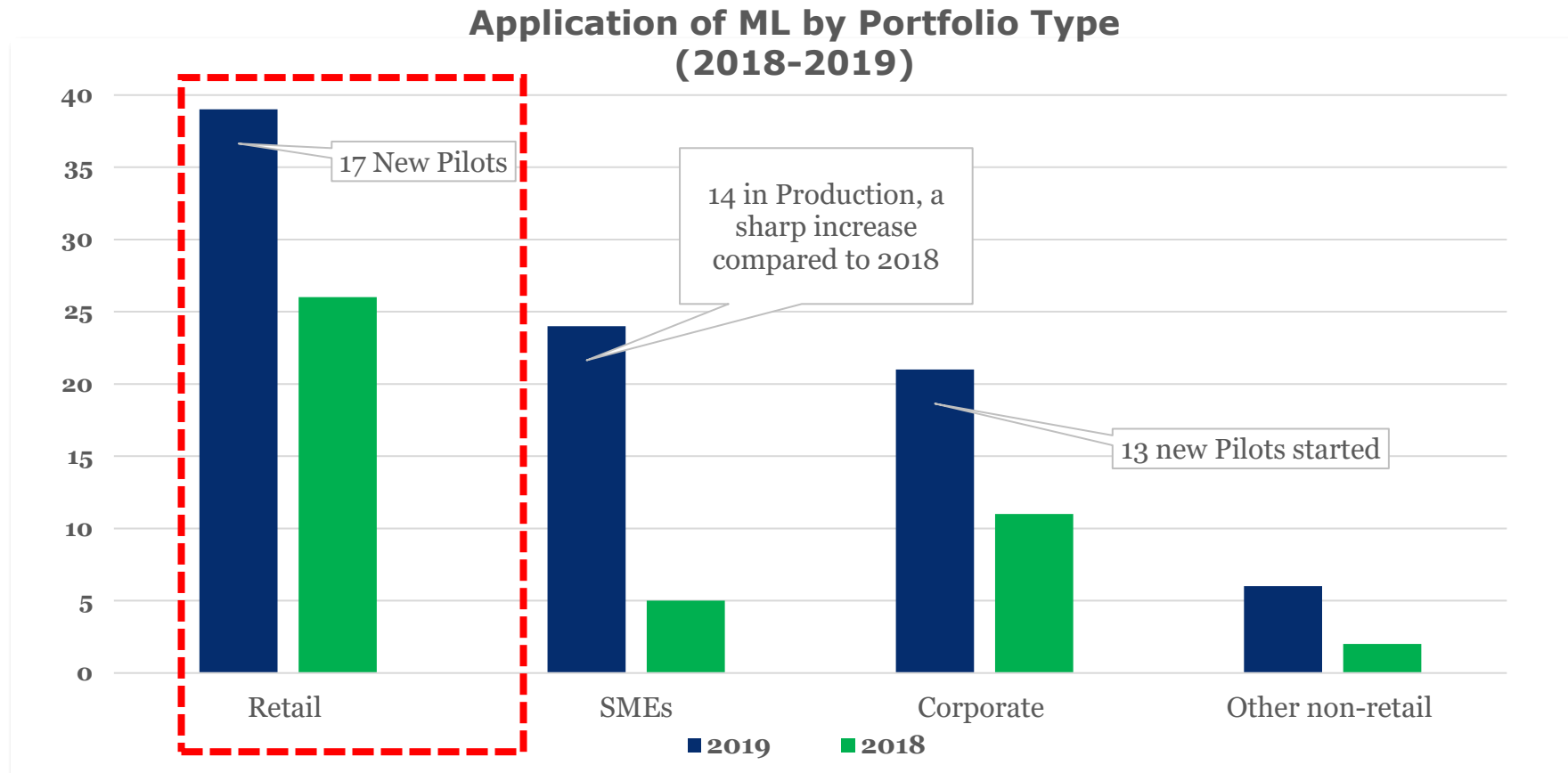
**Maturity Level in Application of ML  
(2018-2019)**



# Machine Learning Application by Portfolio (2018-2019)

Where the predominant 2018 usage was in Retail (with some in credit monitoring for large corporates), 2019 has seen significant expansion in SME portfolios, a 380% increase.

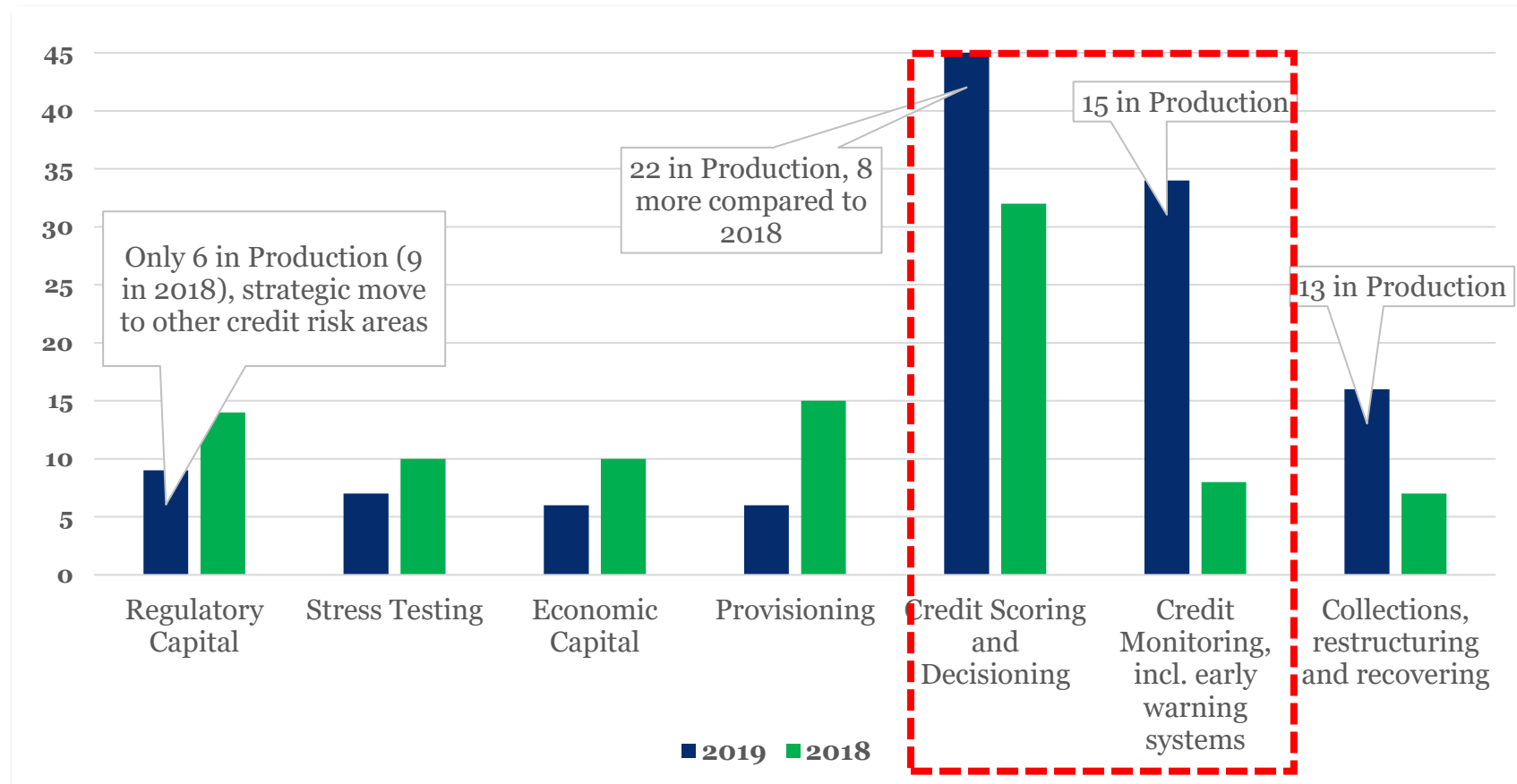
Expanded usage has also continued to other sectors, particularly with the launch of new pilot projects.



# Specific Areas of Usage (2018-2019)

Credit scoring and decisioning continues to be the leading area for applying these technologies, but with significant growth in credit monitoring and collections, restructuring, and recovering.

Application of ML by Areas of Usage (2018-2019)

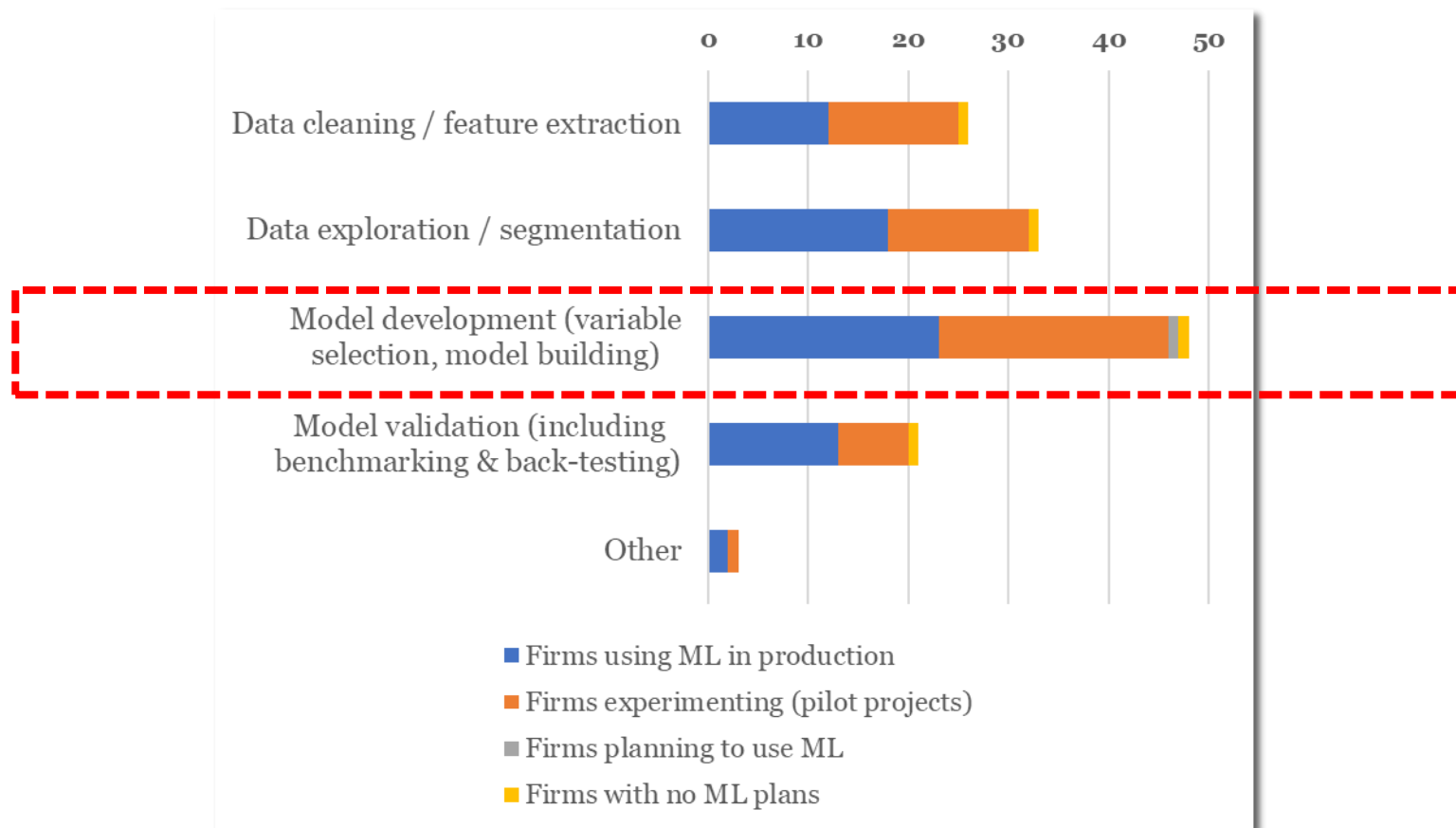


# Application by Credit Risk Functions (2019)

Firms continue to use machine learning in the model validation function, developing benchmark, or “challenger” models built using competing modeling approaches.

However, its main function has been for “model development” in particular for model building and variable selection.

**ML use by credit risk function (2019)**



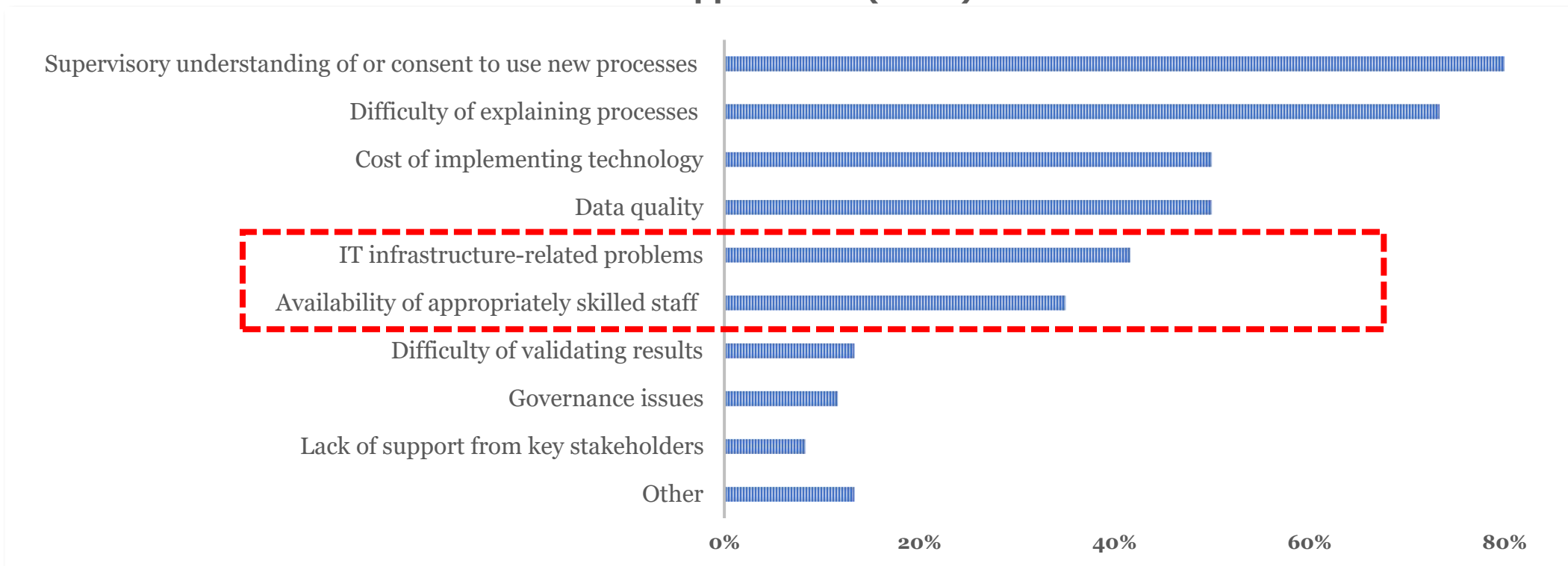


# Challenges to Machine Learning Adoption (2019)

The most selected challenges in 2019 relate to supervisory understanding and consent as well as “explainability”, though “data quality”, “IT infrastructure-related problems”, and “availability of appropriately skilled staff” were often cited as the most impactful barriers to implementation.

Half of respondents picked “data quality” as a challenge. Of those 30 firms, 100% chose “multiple data sources and formats”, making it the most selected data quality issue encountered.

**Key Challenges of Using ML Compared to Previously Used Approaches (2019)\***



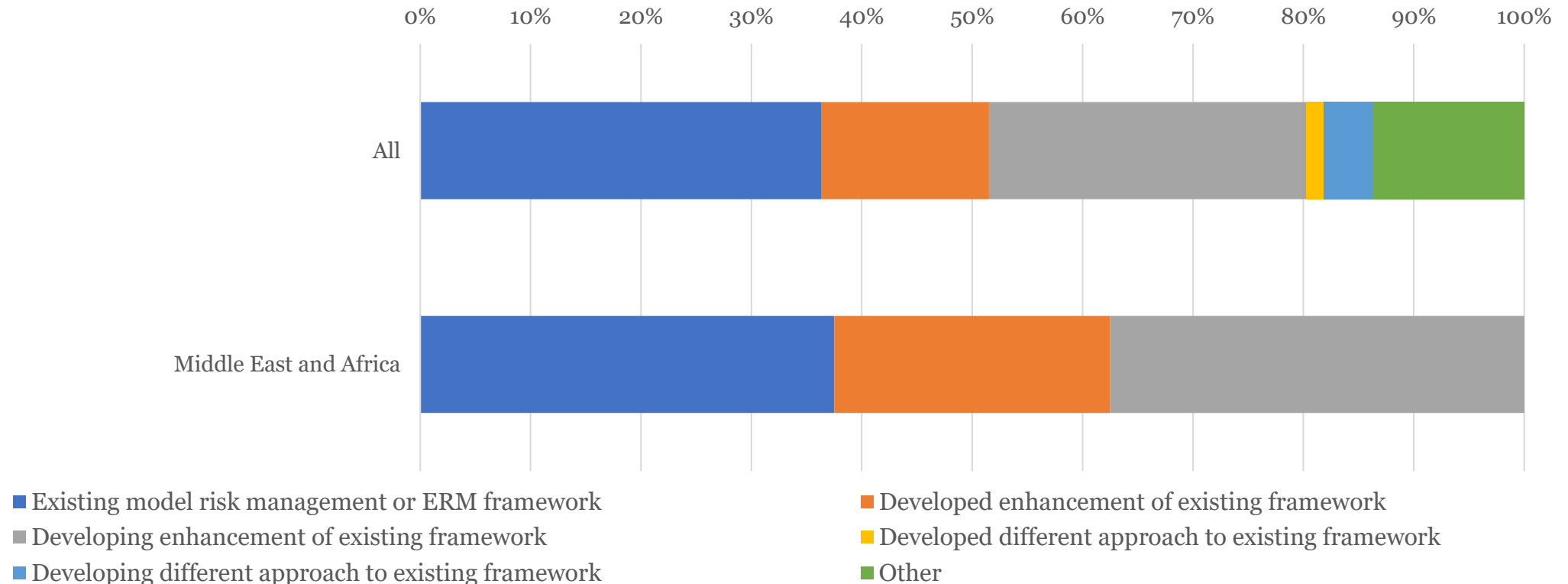
# **Machine Learning Governance Aspects and Controls**

# Model Governance Process in Place for ML

Although 36% of firms are using their existing model risk management framework for ML, half of respondents indicated that a new framework for ML has been developed (16%) or is being developed (34%).

## What is the process of model governance currently in place for ML?

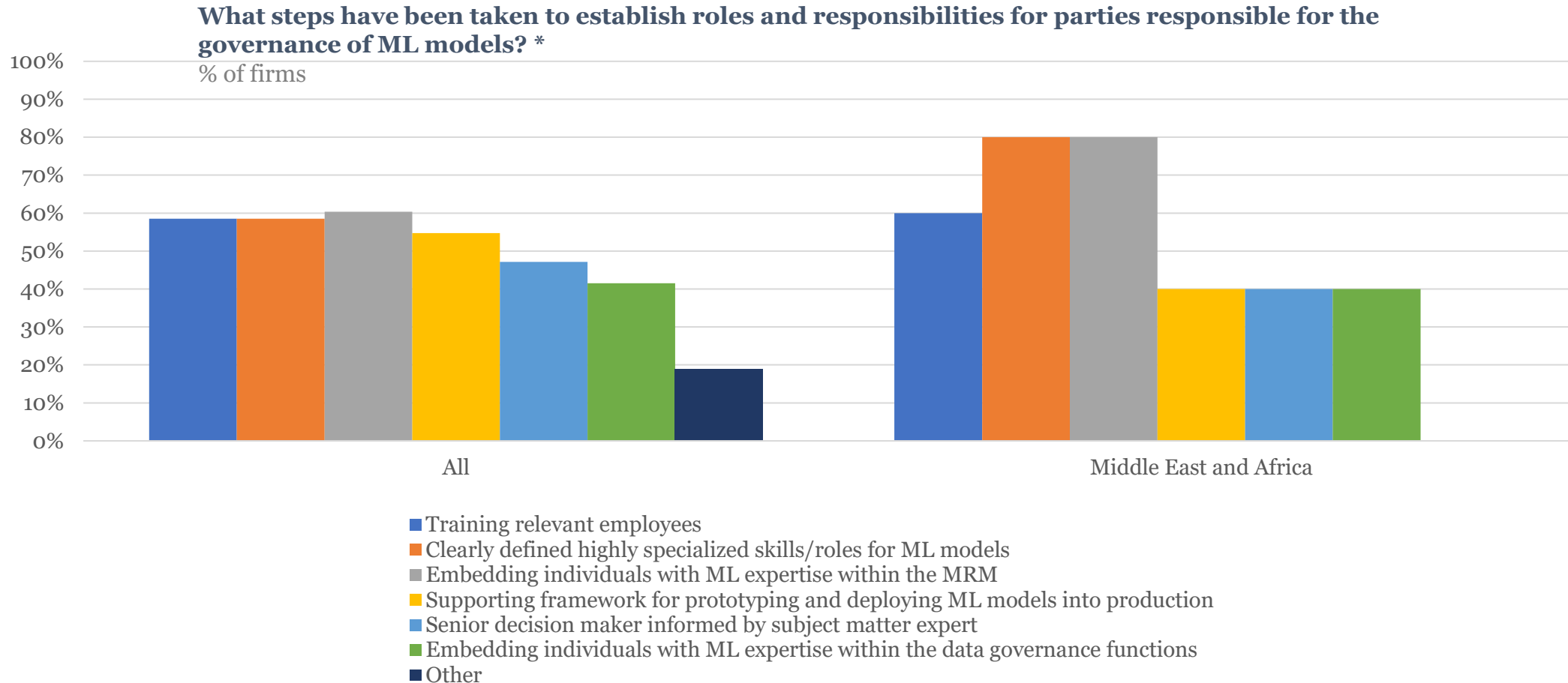
% of firms



# Establishment of Roles and Responsibilities

83% of all respondents have clearly articulated the roles and responsibilities of the parties in charge of the governance of ML models.

“Embedding individuals with ML expertise within the model risk management” was the top answer, followed closely by “providing training for relevant employees” and “clearly defining the highly specialized skills/roles required for ML models.”



\*Firms were able to select multiple choices. Sample of 53 FIs that answered "yes" to whether roles and responsibilities are clearly articulated in the governance for ML models.

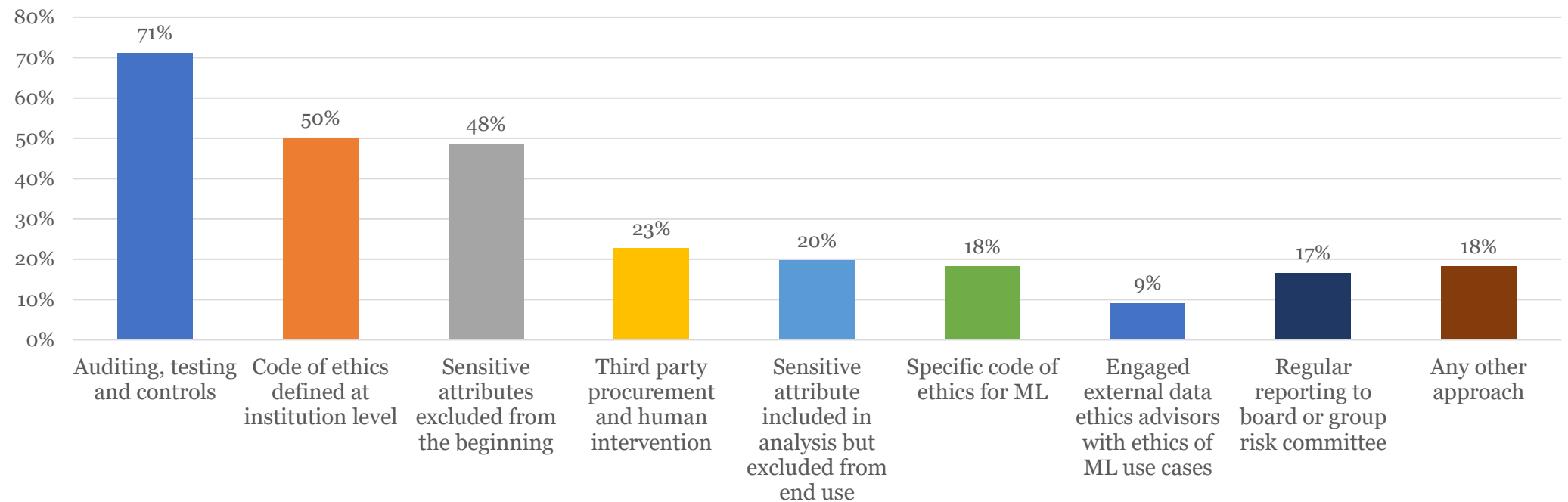
# Controls Against Unfairly Biased Outcomes

Firms rely on several control processes to mitigate against bias and discrimination in ML models.

The most common selections made by firms regarding how to mitigate bias and discrimination in ML models were “auditing, testing and controls”, “code of ethics defined at the institution level”, and “excluding sensitive attributes from the beginning and not including these as part of the feature analysis / selection / engineering process”.

## What controls are in place to mitigate against ML models producing unfairly biased or discriminatory outcomes? \*

% of firms

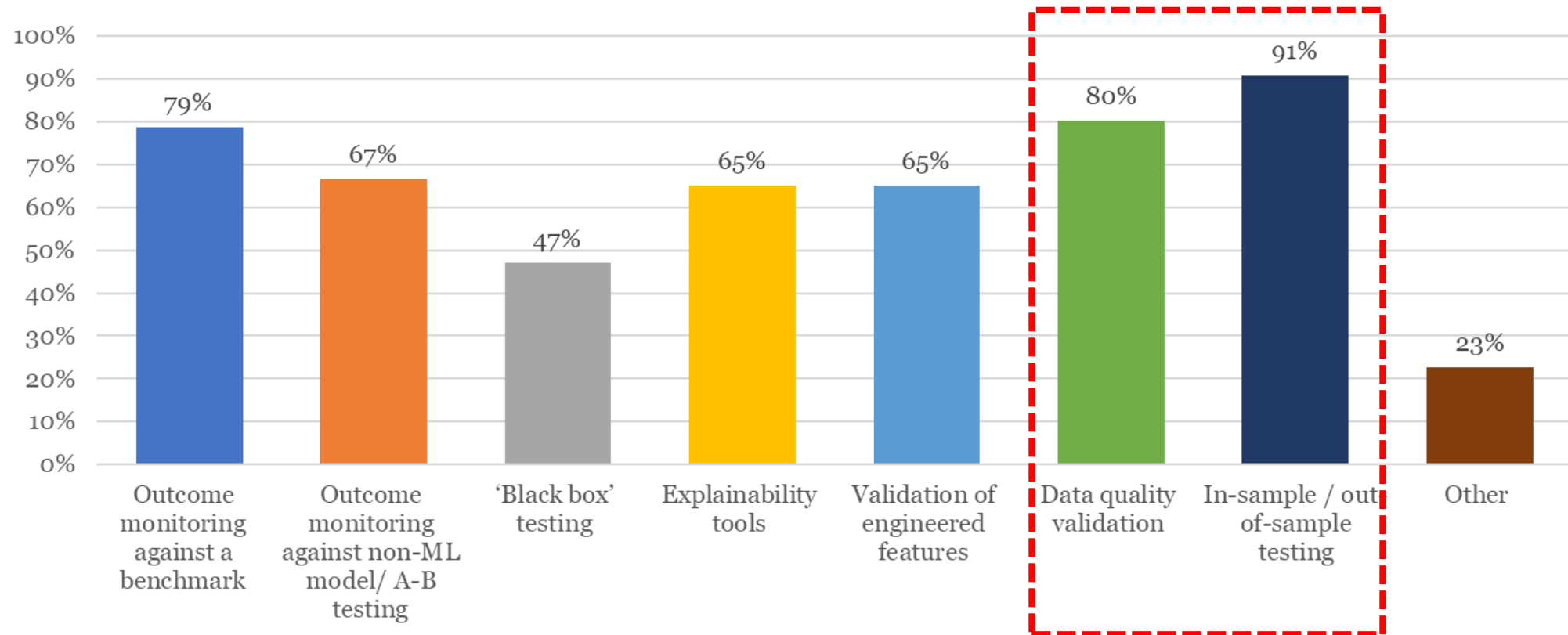


\* Firms were able to select as many options as appropriate.

# Model Validation: Assessing ML Model Robustness

The most common validation methods are in-sample / out-of-sample testing followed closely by data quality validation and outcome monitoring against a benchmark.

**What model validation techniques are used to assess machine learning model robustness? \***  
% of firms



\* Firms were able to select as many options as appropriate.



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