Economic Benefits of Score Market Competition for Conforming Mortgages

Price Compression and Substitution Effects Under Heterogeneous Lender Adoption

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16 March 2026

Prepared by Deep Future Analytics.

This study was commissioned and funded by VantageScore Solutions, LLC. All modelling decisions, assumptions, and conclusions are those of the authors.

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Executive Summary

Economic Impact of FHFA's Decision to Accept VantageScore 4.0

On July 8, 2025, the Federal Housing Finance Agency (FHFA) announced that Fannie Mae and Freddie Mac will accept mortgages originated using the VantageScore 4.0 credit score. This decision introduces direct competition into the GSE-conforming mortgage credit score market for the first time, allowing lenders to choose between: The results demonstrate that the FHFA's introduction of credit score competition produces durable, measurable, and robust economic benefits for lenders and the broader mortgage ecosystem. Every plausible scenario examined in this analysis resulted in significant cost savings.

- VantageScore 4.0.
- FICO Classic (legacy model which will be replaced) and FICO 10T (the replacement model)

This study evaluates the economic consequences of that competitive shift, specifically focusing on the impact to credit score costs that are ultimately borne by the mortgage industry.

Evaluation of Credit Score Cost Savings

Assuming full adoption of VantageScore 4.0 for a first year spanning 2026 and 2027, the potential cost savings from the FHFA decision can be evaluated as follows:

Estimated savings in 1st year assuming 100% lender conversion	2026	2027
Expected Mortgage Originations[1]	5,801,000	5,741,000
Expected Number of Scores Pulled[2]	87,450,000	85,925,926
FICO Price per score[3]	$10.00	$13.50
Av. VantageScore price per score[4]	$1.00	$1.00
Cost savings per score	$9.00	$12.50
Total Cost Savings	$787,050,000	$1,074,074,074
Cost savings with 7/1/2026 switch date[5]	**$930,562,037**	

To evaluate the economic implications of various scenarios and assumptions over a 6-year horizon (2027–2032), the authors developed economic models based on three internally-developed pricing scenarios. These scenarios serve as a framework for others to model their own assumptions rather than a formal forecast, as the authors possess no specific insight into future pricing strategies.

1. **Price Escalation Scenario**
   FICO prices increase at 19% annually, consistent with equity analyst expectations, while VantageScore pricing remains unchanged.[6]
2. **Static Pricing Scenario**
   Credit score prices remain at published 2026 levels.[7]
3. **Price Adoption Equilibrium (PAE) Scenario**
   FICO pricing adjusts in response to market competition based on economic modelling of price/adoption equilibrium (PAE), while VantageScore pricing remains unchanged.[8]

Summary of Results by Incumbent Pricing Scenario

10th–90th percentile ranges across 25 risk-premium parameterizations. Non-GSE and total figures assume equivalent pricing and adoption assumptions applied to the remaining ~63% of mortgage origination volume.

	Price Escalation	Static Pricing	PAE Equilibrium
Scenario Description	Incumbent raises prices 19% CAGR	Holds price steady at $10.00 ($30/TMP[9])	Reprices to PAE equilibrium at $3.59 (~$11/TMP[9])
FICO : VantageScore market share by end of 2032	0–01 : 99–100	3–15 : 85–97	71–91 : 9–29
Savings per closed loan	$130 – $135	$115 – $132	$92 – $122
Total cost savings 2027–2032, GSE loans	$1.6B – $1.7B	$1.4B – $1.6B	$1.2B – $1.7B
Total cost savings 2027–2032, non-GSE loans	$2.6B – $2.9B	$2.4B – $2.8B	$2.1B – $2.8B
Total cost savings 2027–2032, all mortgages	$4.2B – $4.5B	$3.9B – $4.4B	$3.4B – $4.5B

Scope, Assumptions and Limitations

The study's analysis considered an array of plausible factors and included wide ranges around key sensitivities.

Factors incorporated into modelling include:

- **Switching cost.** Adopting a new credit score requires legal review, technology integration, staff retraining, and a period of parallel testing. These one-time costs vary by institution, ranging from approximately $50,000 for smaller lenders to $1,000,000 for complex operations, equivalent to per-TMP switching friction of approximately $0.10 to $2.01. The analysis uses $1,000,000 purely for conservatism, to avoid overstating adoption or savings.

- **Lender risk premia**. Not all lenders will switch scores even when it saves money. Some move quickly on price signals; others are conservative institutions that require significant economic justification before changing an established workflow. The model accounts for this full spectrum of lender behavior, from early adopters to the most risk-averse.
- **Competitive pricing response**. The model solves for the price FICO would charge, according to economic theory, once it faces a credible lower-priced competitor—the price that maximizes its revenue given the risk of losing customers. This equilibrium price is always below FICO's current $10 per score ($30/TMP), regardless of assumptions about lender conservatism.
- **Adoption over time**. Lenders do not switch instantly. The model reflects realistic institutional decision cycles (budget approvals, model evaluations, regulatory sign-offs) producing a gradual build in adoption over the 2027–2032 horizon rather than an instantaneous shift. Once a lender has switched, it would not revert unless FICO lowered its price below VantageScore.
- **Two sources of savings**. Direct substitution (lenders switching to VantageScore) and price compression (FICO reducing price to defend share) are both tracked.

Range of outcomes. All results reflect a wide range of assumptions about how conservative or risk-averse the lending market is. The figures reported are not single-point estimates but ranges covering the spectrum from the most cautious lending environment to the most competitive.

Key assumptions across models and scenarios:

- VantageScore pricing is assumed constant at $1.00 per score and competitive responses by VantageScore are not modeled.
- FICO pricing is based on the typical standard price per score, not the new alternative model with a closing fee.
- Three pulls are not necessary for prequalification, and per-score fees are assumed identical across pull types.
- FICO prices its new 10T model the same as it prices its legacy model.
- The model assumes functional interchangeability for mortgage underwriting.
- Risk-premium inputs are calibrated, not estimated from transaction-level data.
- Potential secondary effects (expanded credit eligibility, mortgage insurance impacts, interest rate compression) are not included, likely resulting in the study understating total economic benefit.

Factors not explored, but worthy of future study:

- Having new credit score models that can score a larger portion of the population could enable substantial benefits to willing homeowners for whom the incumbent is incapable of scoring, enabling some a first opportunity for homeownership.

- Having new credit score models that can better evaluate borrower risk can benefit qualifying borrowers with better pricing and reduce losses for lenders and taxpayers and improved pricing for lenders who securitize mortgage loans.
- Impacts on other industry participants, such as investors in residential mortgage-backed securities and mortgage insurers from improved pricing and reduced losses from more accurate models.

Summary

FHFA's acceptance of VantageScore 4.0 introduces meaningful price competition across the mortgage credit scoring market.

Within the frameworks examined we see:

- Savings are positive under every modeled assumption.
- Competitive pressure constrains either pricing or market share under every modeled scenario.
- Per-loan cost reductions are economically material.
- Upwards of billions of dollars in cumulative industry savings.

[1] Mortgage Bankers Association Jan 2026 Forecast of Total 1- to 4-Family (000s loans)
[2] Estimated based on consensus of analyst FICO revenues, MBA mortgage originations forecast and published FICO pricing
[3] FICO public press releases and 2027 derived from consensus of analyst estimates (Baird November 2025 Research Report and Raymond James January 2026 Research Report)
[4] Credit bureau public press releases
[5] Assuming a 7/1/2026 switch date with equal weighting across the remaining 2026 volume and full 2027 volume
[6] Baird November 2025 Research Report and Raymond James January 2026 Research Report
[7] FICO and Credit Bureau Press Releases from October 2025
[8] Using economic models defined within this report
[9] Tri-Merge Pull (TMP) is a requirement by the Government Sponsored Entities

1 Introduction and Economic Motivation

This document presents the economic framework used to evaluate competitive dynamics in the mortgage credit score market when a lower-priced alternative becomes operationally viable. The purpose of the analysis is not to adjudicate predictive performance differences, nor to advocate a particular provider. Rather, the objective is to characterize how pricing power evolves in the presence of heterogeneous lender behavior and non-trivial switching frictions.

Historically, the mortgage score market has exhibited limited effective competition. The emergence of a materially lower-priced alternative does not mechanically imply immediate universal switching. Lenders face governance processes, integration effort, transitional risk, and internal risk tolerance considerations. Some of these are observable cash costs. Others reflect institutional heterogeneity in perceived risk.

The framework below formalizes these mechanisms. It separates observable implementation cost from heterogeneous non-price risk premia and derives equilibrium adoption and incumbent pricing as the outcome of threshold-based decision making. The analysis is structural in interpretation but intentionally parsimonious in functional form.

2 Theoretical Structure

To evaluate the possible economic impacts of VantageScore authorization for use in mortgage originations by Fannie Mae and Freddie Mac, we construct a theoretical framework that considers not only the relative price difference between FICO and VantageScore scores at current levels, but also the possibility that FICO could reduce its price in response to competitive pressure or increase price in response to investor expectations. The model captures heterogeneous lender adoption behavior in the presence of switching costs and derives the incumbent's equilibrium pricing response under competitive entry.

This model does not consider any changes in the price per score for VantageScore. As such, it is not a full competitive equilibrium model. Rather, it is a near-term simulation of only the first step in what would be an ongoing competitive environment.

2.1 Notation

Table 1 defines the principal symbols used throughout the document.

Terminology: tri-merge pull (TMP). In mortgage origination, each credit inquiry retrieves data from all three national credit bureaus (Equifax, Experian, TransUnion) simultaneously. We define a *tri-merge pull* (TMP) as the combined cost of this three-bureau inquiry. At current list prices, one TMP costs \$30 for FICO (\$10 $\times$ 3 bureaus) and \$3 for VantageScore (\$1.00 $\times$ 3 bureaus). All prices, savings, and cost figures in this study are expressed per TMP unless otherwise noted.

2.2 Economic Environment

Let total in-scope mortgage TMP volume over the relevant decision horizon be denoted by Q. Two suppliers operate in the market:

$$\text{Incumbent (FICO)} \quad \text{price } p_f,$$
$$\text{Entrant (VantageScore)} \quad \text{price } p_v.$$

Table 1: Notation and symbols.

Symbol	Definition	Units
TMP	Tri-merge pull	
Q	Total in-scope mortgage TMP volume	TMPs
p_f	Incumbent (FICO) price per TMP	\$/TMP
p_{f0}	Current observed FICO price	\$/TMP
p_v	Entrant (VantageScore) price per TMP	\$/TMP
Δp	Price gap, $p_f - p_v$	\$/TMP
C_0^{sw}	Total one-time switching cash cost	\$
N	Annual in-scope TMP volume	TMPs/year
H	Decision horizon	years
r	Discount rate for TMP amortization	dimensionless
s	Amortized per-TMP switching friction	\$/TMP
R_i	Lender-specific risk premium	\$/TMP
μ, σ	Log-space parameters of risk premium distribution	log-\$
$x(p_f)$	Net gap available to offset risk premium, $(p_f - p_v) - s$	\$/TMP
$a(p_f)$	Aggregate adoption share at price p_f	fraction
$R(p_f)$	Incumbent revenue at price p_f	\$
$C(p_f)$	Total market expenditure at price p_f	\$
S	Total savings vs. baseline	\$
p_f^*	Equilibrium incumbent price	\$/TMP
a^*	Adoption share at p_f^*	fraction

Current observed prices are $p_{f0} = 30$ and $p_v = 3$, implying a price gap of

$$\Delta p = p_f - p_v = 27.$$

The entrant price is treated as fixed over the horizon. The incumbent chooses price considering lender adoption behavior and other internal and external motivations. This situation corresponds to a standard Stackelberg pricing problem in which a dominant firm responds to competitive entry [13, 12].

2.3 Cash Switching Friction

Switching suppliers entails a one-time cash outlay that includes governance validation, systems integration, testing, documentation, and transitional monitoring. Let total switching cash cost be C_0^{sw}. Let annual in-scope TMP volume be N, and let the relevant decision horizon be H years.

Switching costs play a well-documented role in limiting competitive discipline in procurement markets. Klemperer [5] shows that even small switching costs can confer substantial pricing power on incumbents by segmenting consumers into captive and contestable pools. Farrell and Shapiro [2] extend this analysis to dynamic settings, demonstrating that incumbents rationally exploit installed-base advantages. In the present context, switching friction is an institutional analog: lenders face non-trivial implementation costs that create a wedge between the price differential and the net economic incentive to switch.

To express switching cost in price-equivalent units, we amortize it over the present value of in-scope TMP:

$$\mathrm{PV}(\text{TMP}) = \sum_{t=1}^{H} \frac{N}{(1+r)^t}.$$

The amortized per-TMP switching friction is defined as

$$s = \frac{C_0^{\text{sw}}}{\mathrm{PV}(\text{TMP})}.$$

For sensitivity analysis, a non-discounted approximation is often sufficient:

$$s \approx \frac{C_0^{\text{sw}}}{NH}.$$

This parameter captures only implementation cost. It does not reflect perceived model quality differences or institutional risk tolerance.

2.4 Heterogeneous Risk Premium

The amortized switching friction s captures only the observable cash cost of implementation. It does not capture the full range of considerations that make a lender slow to adopt an alternative score. We model these residual considerations as a lender-specific risk premium R_i, measured in dollars per TMP equivalent.

What the risk premium captures. A lender evaluating whether to adopt an alternative score may react to uncertainties beyond integration cost. This includes any institution-specific procedural or perceptual friction to adoption. It is the dollar-per-TMP equivalent of whatever additional price gap a particular lender requires before it will adopt, regardless of the underlying motivation.

A lender adopts the entrant if the price gap exceeds both switching friction and its risk premium:

$$p_f - p_v \geq s + R_i.$$

Define the net gap available to offset risk premium:

$$x(p_f) = (p_f - p_v) - s.$$

Adoption is therefore a threshold decision. The aggregate adoption rate equals the fraction of lenders whose risk premium lies below $x(p_f)$.

How the risk premium varies across lenders. Consider two stylized lenders. A large national bank with an established model risk management framework, dedicated scoring analytics staff, and direct GSE relationships may view alternative-score adoption as a manageable operational change. Its risk premium might be \$5–\$8 per TMP—real but modest relative to the price gap. By contrast, a mid-size community lender with a lean compliance team, limited experience validating alternative models, and greater sensitivity to secondary market perception may require a risk premium of \$15–\$25 per TMP before the savings justify the institutional disruption. The distribution of R_i across the industry determines how many lenders fall on each side of the adoption threshold at any given price gap.

2.5 Distribution of Risk Premium

We assume the risk premium follows a lognormal distribution:

$$R_i \sim \text{LogNormal}(\mu, \sigma^2),$$

so that

$$\ln R_i \sim \mathcal{N}(\mu, \sigma^2).$$

The lognormal form reflects the requirement that the risk premium cannot be negative: no lender is paid to switch beyond the price difference. The lognormal distribution further allows a flexible right tail to capture the minority of institutions with substantially elevated caution.

Interpreting the parameters. The distribution is governed by two parameters that have direct economic interpretations:

- **The mean risk premium** (reported in dollar space as $\mathbb{E}[R]$) measures the *central tendency* of the industry's reluctance. A mean of \$8 per TMP represents an industry where the typical lender's non-price concerns are modest relative to the \$27 price gap; a mean of \$18 per TMP represents an industry where the typical lender's caution substantially reduces the available price advantage.

- **The standard deviation** (reported in dollar space as sd(R)) measures the *degree of consensus* across lenders. A low standard deviation (say \$5 per TMP) implies that lenders are relatively homogeneous in their assessment of adoption risk: the industry is ordered, and most lenders will either adopt or not adopt at similar price thresholds. A high standard deviation (say \$20 per TMP) implies substantial disagreement, with some lenders viewing adoption as nearly costless and others viewing it as prohibitively risky.

Industry structure suggests moderate ordering. The mortgage origination industry uses a small number of common loan origination systems and vendor platforms. Because the major vendors have already completed technical preparation for multi-score delivery, much of the operational variation that might otherwise drive heterogeneity in risk premia has been compressed. Lenders using the same platform face similar integration paths. This structural commonality suggests that the industry is more ordered than disordered—that is, the standard deviation of the risk premium distribution is more likely to be moderate than extreme. Nevertheless, we sweep the standard deviation over a wide range (\$5 to \$30 per TMP) to characterize outcomes under all plausible assumptions, including the possibility of substantial disagreement among lenders.

Under the lognormal assumption, aggregate adoption equals

$$a(p_f) = \begin{cases} 0, & x(p_f) \le 0, \\ \Phi\left(\frac{\ln(x(p_f))-\mu}{\sigma}\right), & x(p_f) > 0, \end{cases} \tag{1}$$

where $\Phi(\cdot)$ denotes the standard normal cumulative distribution function.

This formulation embeds heterogeneous thresholds directly. It does not impose arbitrary bounds on adoption. Some lenders may never adopt within realistic price ranges because they lie in the right tail of the risk-premium distribution. This model assumes that once a lender switches scores, they could only be induced to switch back to the incumbent if the incumbent's price fell below the entrant's price.

2.6 Incumbent Pricing Response

Incumbent revenue is given by

$$R(p_f) = Qp_f\left(1 - a(p_f)\right).$$

As one possible scenario, we consider the case where the incumbent chooses p_f to maximize revenue over a feasible interval:

$$p_f^* = \arg\max_{p_f \in [\underline{p}, \overline{p}]} R(p_f).$$

The range extends from near zero to well above the current baseline price, allowing the model to evaluate both price reduction and price increase strategies.

To find the maximum value, we take the derivative, set to 0, and solve for p_f

$$\frac{dR}{dp_f} = Q\left[(1 - a(p_f)) - p_f a'(p_f)\right] = 0.$$

At this price, the marginal revenue from a price increase on retained volume is exactly offset by the revenue lost to additional competitor adoption [12].

2.7 Total Cost and Market Savings

Baseline expenditure under the status quo is the TMP volume times the original incumbent price.

$$C_0 = Qp_{f0}.$$

Equilibrium expenditure under competition is

$$C^* = Q\left[p_f^*(1-a^*) + p_v a^*\right].$$

Total savings are

$$S = C_0 - C^*.$$

Savings arise from two channels: substitution toward the lower-priced entrant and incumbent price compression. We decompose these channels explicitly:

$$S_{\text{compression}} = Q(1-a^*)(p_{f0} - p_f^*), \tag{2}$$

$$S_{\text{substitution}} = Q\,a^*(p_{f0} - p_v), \tag{3}$$

$$S = S_{\text{compression}} + S_{\text{substitution}}. \tag{4}$$

The compression channel (2) measures savings accruing to lenders who remain with FICO but pay a lower price. For FICO price increases, an expansion cost is incurred by those who remain. The substitution channel (3) captures savings from lenders who switch to the lower-priced entrant. The relative importance of each channel depends on the incumbent's pricing response: if the incumbent reprices toward equilibrium, compression dominates; if the incumbent holds or raises price, substitution dominates.

2.8 Extended Price Range and Strategic Implications

Extending the price domain beyond current levels allows evaluation of whether continued price increases are sustainable. As incumbent price rises, competitor adoption increases because the net gap $x(p_f)$ expands. However, if the right tail of the risk-premium distribution is sufficiently heavy, a residual captive segment may persist even at elevated prices.

Revenue may therefore exhibit one of two patterns. If dispersion σ is moderate, revenue peaks at an interior price and declines thereafter. If dispersion is large, a sufficiently large captive tail may sustain higher prices over a broader range. The model therefore provides a disciplined method for evaluating the plausibility of continued price increases in the presence of competitive entry.

2.9 Economic Foundations

The framework draws on well-established economic principles. Adoption is modeled as a heterogeneous threshold decision, a standard representation in industrial organization and discrete choice analysis [7]. Incumbent pricing follows classical marginal revenue logic under differentiated competition [3, 12]. The switching cost structure follows the formalization in Klemperer [5] and Farrell and Shapiro [2]. The vertical quality differentiation interpretation (where lenders perceive FICO and VantageScore as differing in a single quality dimension, perceived reliability, with heterogeneous valuations) is consistent with Shaked and Sutton [11].

The contribution here is not theoretical innovation but the disciplined application of these principles to a specific procurement market characterized by measurable switching costs and heterogeneous institutional risk preferences.

3 Calibration and Parameter Selection

This section documents the selection of all model inputs. Because no transaction-level dataset of lender switching behavior currently exists, we adopt a simulation approach: observable parameters are set to market values, and the unobservable risk-premium distribution is swept over a grid of plausible values. Table 2 summarizes the complete parameterization.

Table 2: Model parameters: baseline values and sensitivity ranges.

Parameter	Symbol	Baseline	Sensitivity range	Source / basis
Market prices				
FICO price	p_{f0}	\$30/TMP	—	Published schedule
VantageScore price	p_v	\$3/TMP	—	Published schedule
Switching friction				
One-time switching cost	C_0^{sw}	\$1,000,000	—	Industry estimate
Annual TMP volume	N	200,000/yr	—	Representative mid-size lender
Decision horizon	H	3 years	—	Typical IT amortization horizon
Discount rate	r	10%	—	WACC proxy
Amortized friction	s	\$2.01/TMP	—	Derived (see below)
Risk premium distribution				
Mean (dollar space)	$\mathbb{E}[R]$	\$12/TMP	\$5–\$20	Grid sweep
Std. dev. (dollar space)	$\text{sd}(R)$	\$8/TMP	\$5–\$30	Grid sweep
Market scale				
TMP volume	Q	—	—	Per-TMP normalization

3.1 Score Prices

Current list prices at the bureaus are \$30 per TMP for FICO and \$3 per TMP for VantageScore, a price differential of \$27 per TMP. These are taken as given. The VantageScore price is held fixed throughout the analysis. The FICO price is the incumbent's decision variable. Equity analyst estimates of FICO's Scores revenue imply a compound annual growth rate of approximately 19% in mortgage score pricing [10, 8], a trajectory that would bring the effective cost per TMP above \$85 by 2032. We therefore extend the analysis over the range \$0.50-\$80 per TMP to characterize outcomes under both price reductions and continued price increases.

This price competition analysis does not consider inflation adjustments. All dollar results can be interpreted as being in real 2026 dollars for simplicity. Nor do these prices reflect any markups by resellers in either dollar or percentage terms.

3.2 Switching Friction Derivation

Switching costs vary considerably by institution. Smaller lenders may incur as little as \$50,000 in implementation costs, while large or complex operations may face costs approaching \$1,000,000.

Because institution size also determines origination volume, both the numerator and denominator of the amortized friction differ across lender types.

Smaller lender. A smaller lender originating approximately 5,000 loans per year at 5 TMPs per loan generates $N = 25{,}000$ TMP per year. With a $50,000 switching cost, a 3-year horizon, and a 10% discount rate, the present value of the TMP stream is $\mathrm{PV}(\text{TMP}) = 22{,}727 + 20{,}661 + 18{,}783 = 62{,}171$, giving an amortized switching friction of $s = \$50{,}000/62{,}171 \approx \$0.80$ per TMP.

Larger lender. A larger lender originating approximately 40,000 loans per year generates $N = 200{,}000$ TMP per year. With a $1,000,000 switching cost and the same horizon and discount rate, $\mathrm{PV}(\text{TMP}) = 181{,}818 + 165{,}289 + 150{,}263 = 497{,}370$, giving $s = \$1{,}000{,}000/497{,}370 = \$2.01$ per TMP. The undiscounted approximation yields $s \approx \$1.67$, so the discounted value is modestly higher, reflecting the time value of front-loaded costs. In both cases the amortized switching friction is well below the $27 price differential. The analysis uses $s = \$2.00$ per TMP, the upper end of this range, purely for conservatism.

3.3 Risk Premium Grid

The risk premium distribution is the primary source of uncertainty in the model. Because no empirical distribution of lender risk attitudes toward score switching is available, we treat the mean and standard deviation of the lognormal distribution as free parameters and sweep them over a wide grid:

- Mean risk premium: $5 to $20 per TMP (61 grid points).
- Standard deviation: $5 to $30 per TMP (61 grid points).

The lower bound of $5 for the mean represents a market where most lenders view score switching as low-risk; the upper bound of $20 represents a market where the average lender requires a risk premium exceeding the current price gap. The standard deviation range spans from nearly homogeneous lender preferences (sd = $5) to highly dispersed attitudes (sd = $30, where a substantial minority is far more risk-averse than the median).

The full grid comprises $61 \times 61 = 3{,}721$ parameter combinations. Each grid point represents a separate computation of the incumbent's equilibrium price.

3.4 Market Scale

All simulation results in this section are expressed per TMP. Savings and revenue figures are reported in dollars per total industry TMPs. Percentage savings and adoption shares are dimensionless. This per-TMP normalization is independent of market volume. Section 6 applies these per-TMP results to projected GSE-conforming origination volumes to obtain aggregate economic savings.

4 Simulation Results

This section provides outputs that characterize the equilibrium effects of authorizing VantageScore as a competitive market entrant against the incumbent FICO score. All figures share the common market parameters specified in Table 2 and report results per industry score TMP. This is a subtle but important distinction: normalizing to total industry TMP incorporates both adoption and retention rates across competitors.

4.1 Single-Scenario Diagnostics

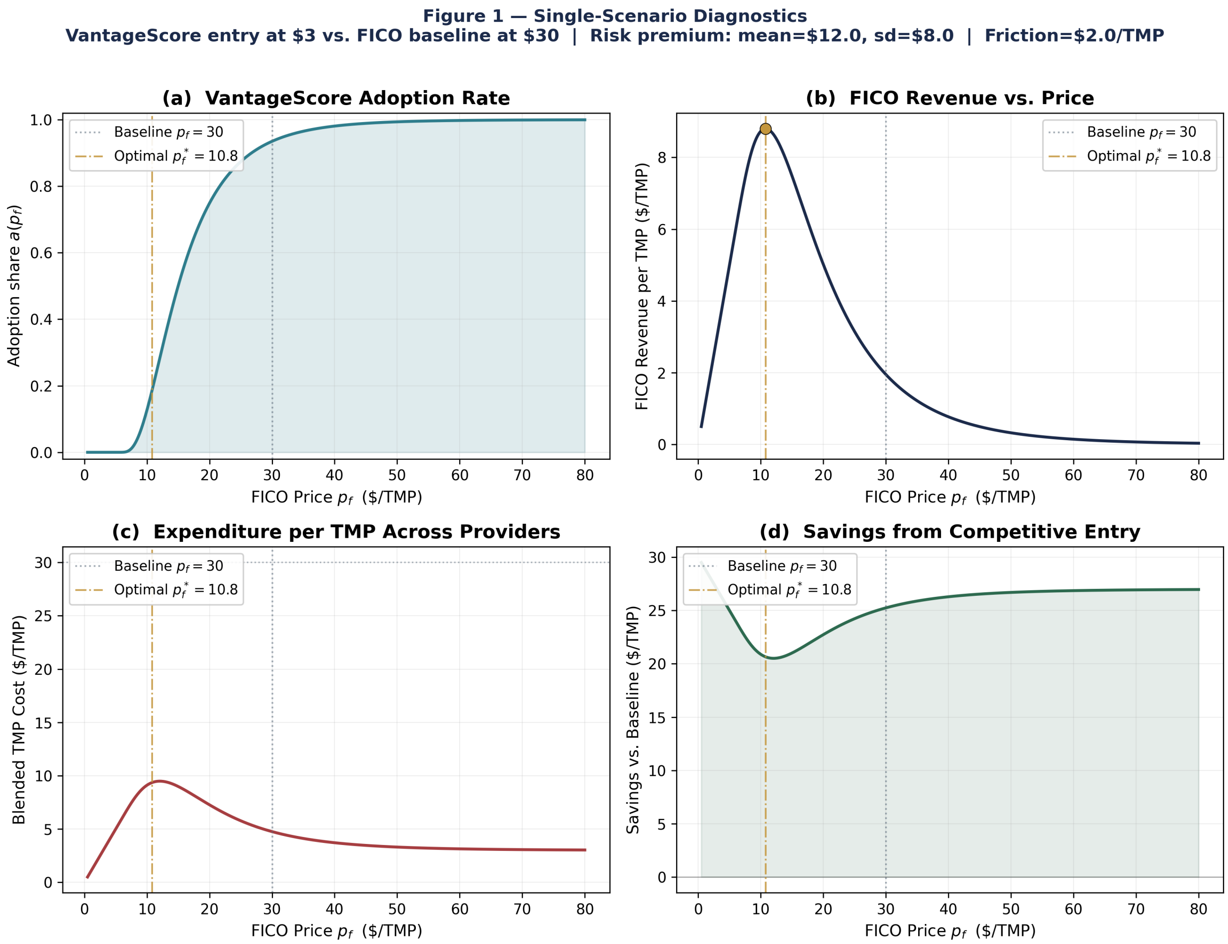

Figure 1: Single-scenario diagnostics at baseline risk-premium parameters (mean = $12, sd = $8). Each panel plots a market outcome as a function of the FICO price p_f. The dashed vertical line marks the current FICO price ($30); the dot-dashed line marks FICO's equilibrium response.

Figure 1 presents four panels, each plotting a key market outcome as a continuous function of the FICO price p_f under a sample parameterization of the risk premium (mean = $12/TMP, sd = $8/TMP). Two reference lines appear in every panel: a *dashed* vertical line at the current FICO price of $30, and a *dot-dashed* vertical line at FICO's equilibrium price p_f^* under stated assumptions.

Panel (a): VantageScore Adoption Rate. The adoption curve $a(p_f)$ gives the share of lenders that would switch to VantageScore at any given FICO price. It is derived from the cumulative distribution function of the lognormal risk premium: a lender switches when the price differential net of friction exceeds its idiosyncratic risk premium. The curve rises from zero (when the price gap is too small to overcome friction) toward one (when the gap dominates even the most risk-averse lender). The shaded area under the curve emphasizes the adoption mass. At the current price of $30, adoption is already non-trivial. At the equilibrium price, FICO concedes a modest adoption share in exchange for maximizing its retained revenue.

Panel (b): FICO Revenue Share. FICO's revenue share per total industry TMP is the product of price and the share of lenders that remain with FICO: $r(p_f) = p_f \cdot (1 - a(p_f))$. This quantity represents what FICO earns, on average, for every TMP in the market—including TMP that go to VantageScore, on which FICO earns nothing. The curve is single-peaked. At low prices, revenue share is constrained by the price itself. At high prices, it falls because adoption erodes the customer base. The gold dot marks the peak—FICO's equilibrium price p_f^*. The key observation is that this peak lies well below the current $30 price, demonstrating that competitive entry forces a substantial price reduction, conditional on the assumed mean and dispersion for the risk premium distribution.

Panel (c): Blended TMP Cost. The blended TMP cost per TMP is $c(p_f) = p_f(1 - a) + p_v \cdot a$, the adoption-weighted average cost across both providers. This panel shows how TMP costs evolve as FICO adjusts its price. At the current $30, the market is near its cost peak. As FICO reduces price in response to entry, the blended cost falls sharply, driven by both the direct price reduction on FICO-retained TMP and the substitution of VantageScore TMP for the switching lenders. If FICO raises price, the blended cost still decreases because additional market share loss more than offsets the higher incumbent price.

Panel (d): Savings Decomposition. Total savings per TMP decompose into two channels. Compression savings (green) accrue on TMP that remain with FICO but at a lower price: $(p_{f0} - p_f)(1 - a)$. Substitution savings (teal) accrue on TMP that migrate to VantageScore: $(p_{f0} - p_v) \cdot a$. At the equilibrium price, compression accounts for approximately 76% of total savings and substitution for 24%. As the incumbent price rises above the $30 baseline, the compression channel turns negative (an expansion cost, shown in pink) because retained FICO TMP now cost more than they did before entry. Substitution savings more than offset this cost, so total savings (navy line) remain positive at every price. The crossover illustrates why the composition of savings depends on the incumbent's pricing response: equilibrium repricing delivers savings primarily through lower FICO prices, while above-baseline pricing delivers savings primarily through switching.

More broadly, the simulations evaluate FICO revenue over the range $p_f \in [0.50, 80]$. Under the baseline calibration, revenue per TMP peaks at $p_f^* \approx \$11$. Revenue declines steeply at higher prices, falling below 6% of peak by $50 and below 1% by $80. Even if FICO were to increase price modestly to $35, revenue would fall below its level at the current $30 because the incremental adoption loss more than offsets the per-TMP price gain. The next section systematically scans the range of risk premia to demonstrate the range of possible outcomes.

4.2 Equilibrium Outcomes Across Risk-Premium Assumptions

Figure 2 extends the single-scenario analysis to a systematic grid sweep over risk-premium parameters: the mean ranges from $5 to $20/TMP and the standard deviation from $5 to $30/TMP. Each cell in the 61×61 grid represents a separate optimization of FICO's equilibrium price. The four panels map the resulting equilibrium outcomes as smooth heatmaps with labeled contour lines.

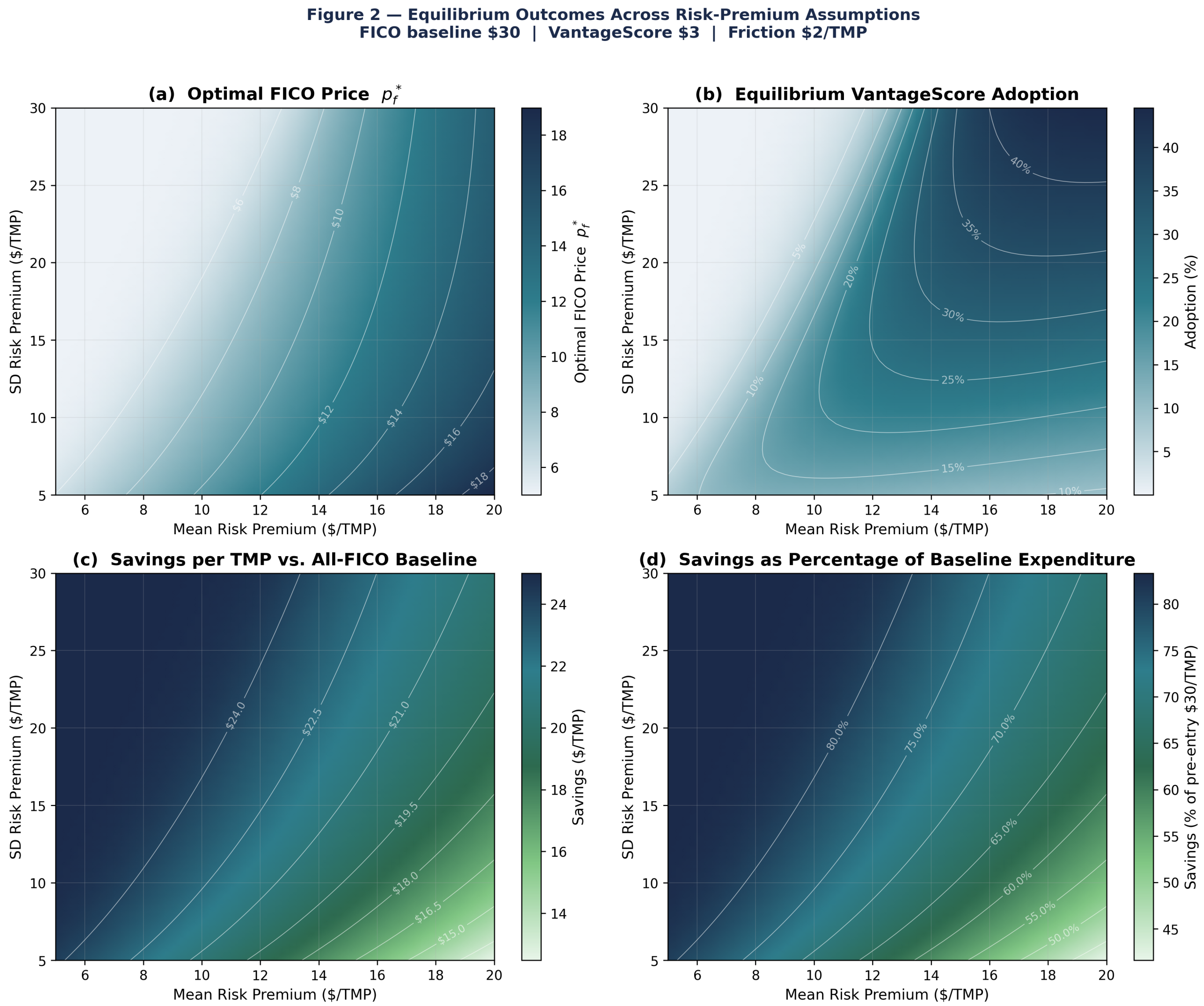

Figure 2: Equilibrium outcomes across a grid of risk-premium assumptions. Each panel is a heatmap over the two-dimensional parameter space (mean risk premium on the horizontal axis, standard deviation on the vertical axis). White contour lines provide numeric reference values.

Panel (a): Equilibrium FICO Price p_f^*. Darker shading indicates a lower equilibrium FICO price under current simulation assumptions (stronger competitive discipline). The contours show that FICO's equilibrium price drops from roughly \$19 in the high-mean, low-dispersion corner (where few lenders are willing to switch) to \$5 in the low-mean, high-dispersion corner (where switching is easy). Notably, p_f^* remains well below the current \$30 across the entire parameter space, confirming that entry forces a substantial price reduction under stated assumptions.

Panel (b): Equilibrium Adoption. This panel shows the fraction of TMP that shift to VantageScore at equilibrium. At FICO's equilibrium response, adoption peaks near 45% in the low-mean, high-dispersion corner. This is by construction: at equilibrium, FICO concedes only enough adoption to maximize its retained revenue. If FICO reprices to equilibrium, the moderate adoption shares reflect the *disciplining effect* of a credible entrant—price compression generates savings even when actual switching is limited. If FICO does not reprice, adoption rises substantially and savings arise through direct substitution instead (Section 4.4).

Panel (c): Economic Savings per TMP. The savings surface is everywhere positive (green shading), ranging from approximately \$12.48 per TMP in the worst case to \$25 per TMP in the best case. The contours run roughly diagonally from upper-left to lower-right, indicating that savings increase when either the mean risk premium falls (more lenders are willing to switch) or the dispersion rises (more heterogeneity expands the tail of easy switchers).

Panel (d): Economic Savings as Percentage of Initial Cost. Expressing savings as a fraction of the pre-entry TMP cost ($p_{f0} = \$30$/TMP) provides a scale-invariant measure of competitive benefit. Percentage savings range from roughly 42% to 83%. Even in the most pessimistic corner of the parameter space (high mean risk premium and low dispersion, representing a market where lenders are uniformly reluctant to switch) economic savings exceed 40% of the initial expenditure.

4.3 Policy Summary—Savings and Adoption Under Uncertainty

Figure 3 consolidates the primary findings from Figure 2 into a single figure. The background heatmap reproduces the percentage-savings surface from Figure 2(d), using a sequential green-to-navy colormap in which darker shading corresponds to larger savings. Superimposed on this surface are dashed gold contours showing the equilibrium VantageScore adoption share.

This overlay makes two relationships immediately visible:

1. **Savings are robustly positive.** Across the entire scanned parameter region (spanning a four-fold range in mean risk premium and a six-fold range in its dispersion) economic savings never turn negative.
2. **Under equilibrium repricing, savings are driven primarily by price discipline.** The adoption contours (gold dashes) show that equilibrium switching ranges from roughly 0% to 45%. Yet savings reach 50–83% of baseline in much of the parameter space. Under this scenario, the dominant channel is the incumbent's price reduction in response to the credible threat of entry, rather than the direct substitution of a cheaper score. If the incumbent does not reprice, the composition shifts: savings arise through direct substitution instead, as shown in Figure 4.

The upper-left corner of the figure (low mean risk premium, high dispersion) represents a market where lenders face low barriers and heterogeneous attitudes toward switching. Here, savings are

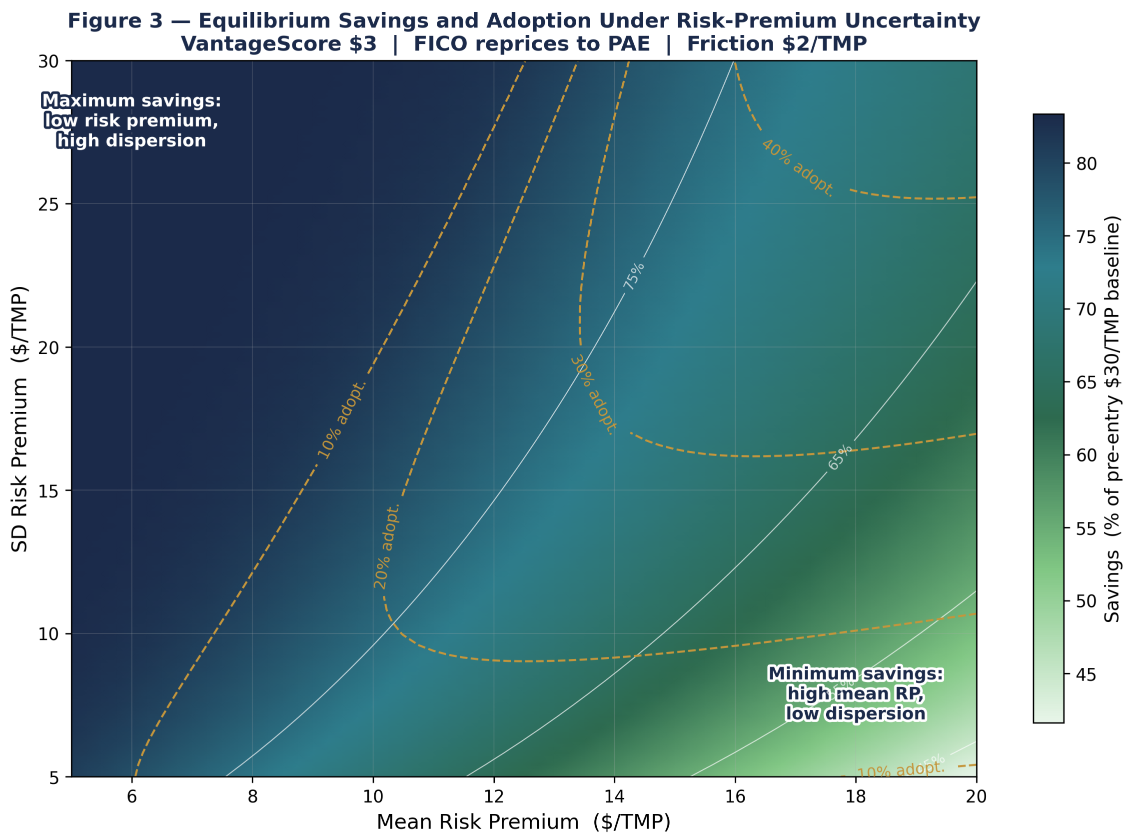

Figure 3: Equilibrium savings and adoption surface. For each combination of risk-premium mean and standard deviation, FICO is assumed to reprice to the Price-Adoption Equilibrium (PAE) that maximizes its revenue; the resulting equilibrium price ranges from $5 to $19 per TMP across this parameter space (see Figure 2a). Background shading indicates savings as a percentage of baseline expenditure; dashed gold contours overlay the equilibrium VantageScore adoption share.

maximized because the competitive threat forces FICO closest to the entrant's price. Notably, the savings and adoption gradients run in opposing directions across the parameter space: maximum savings (83%) occurs where adoption is near zero, because FICO is forced to drop its price to approximately $5/TMP, leaving almost no gap after friction for lenders to exploit. Maximum adoption (45%) occurs in the upper-right corner, where FICO's equilibrium price is higher (~$15/TMP), leaving a sufficient net gap to pull the left tail of the risk-premium distribution across. The lower-right corner (high mean, low dispersion) represents a more cautious market, yet savings remain in the range of 42–50% even there. This robustness to assumption choice indicates that the economic benefits of competitive entry are not contingent on optimistic assumptions about lender behavior.

4.4 Savings Under Alternate FICO Strategies

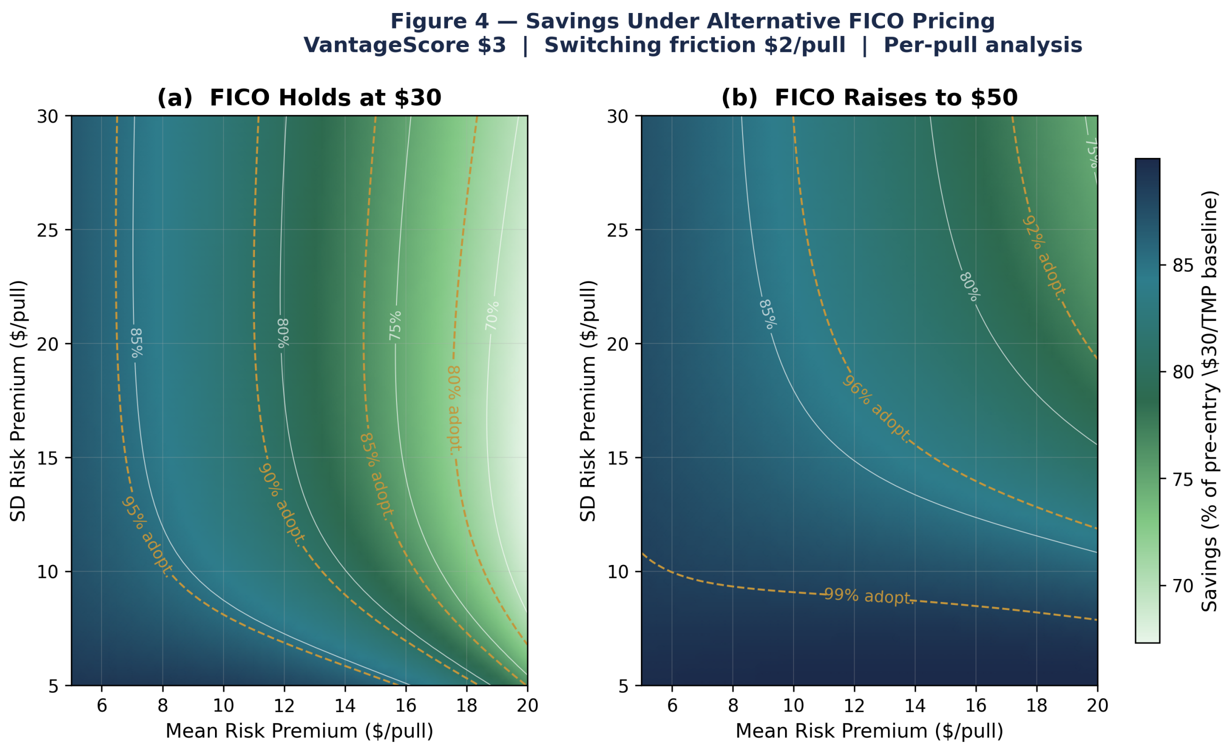

Figure 4: Savings under alternative FICO pricing. Panel (a) holds FICO at its current $30/TMP; panel (b) raises FICO to $50/TMP. Background shading indicates savings as a percentage of baseline expenditure (common color scale across panels); dashed gold contours overlay the equilibrium adoption share.

Figures 1–4 characterize equilibrium outcomes under the assumption that FICO adjusts price to its equilibrium level in response to competitive entry. Figure 4 relaxes this assumption and considers two alternative scenarios: FICO holds its current price of $30/TMP, and FICO raises price to $50/TMP. These bracket the space of alternative incumbent behavior and address a natural question: what happens if FICO does not reprice to the equilibrium level as obtained from current assumptions? The point is that FICO may have a wide range of alternate dynamics to consider that are not visible to the analysis presented here.

Panel (a): FICO Holds at \$30. If FICO maintains its current price, the \$27 price differential relative to VantageScore (\$3/TMP) is large enough to induce substantial switching even after accounting for friction and risk aversion. Adoption ranges from 75% in the most pessimistic corner of the parameter space (high mean risk premium, low dispersion) to 99% where lenders are more willing to switch. Savings range from 67% to 89% of baseline expenditure. Because there is no price reduction in this scenario, savings arise entirely through the direct substitution channel: lenders who switch pay \$3 instead of \$30 on every redirected TMP.

The contrast with the equilibrium scenario (Figures 2–3, where adoption is 0–45% and savings are 42–83%) is instructive. At the current \$30 price, adoption would be far higher than FICO's equilibrium response would permit. Economic savings are comparable in magnitude under both scenarios, but the composition shifts from substitution-dominated (panel a) to compression-dominated (Figures 1–4).

Panel (b): FICO Raises to \$50. If FICO were to increase price to \$50/TMP, whether in response to investor pressure, cost allocation changes, or an attempt to extract surplus from captive lenders, the result appears disadvantageous from an external perspective. The \$47 price differential drives adoption to 90–100% across the entire parameter space. Savings rise to 75–90% of baseline, and they arise despite the price increase because nearly all volume migrates to VantageScore at \$3/TMP. FICO would retain only a residual segment of the most risk-averse institutions.

Taken together, Figures 1–5 establish that economic savings from competitive entry are positive across all examined assumptions and across all plausible incumbent strategies, whether FICO optimizes, holds price, or raises price. The savings are substantial, ranging from 42% to 90% of baseline expenditure. The remaining question is how these savings evolve over time. The next section addresses the transition path.

5 Transition Dynamics With Endogenous Adoption Speed

The scenario analysis of Section 4 characterizes the long-run outcome of competitive entry, but the path to that equilibrium is itself economically consequential. During the transition period, the incumbent's pricing decisions interact with industry adoption dynamics to determine the time profile of economic benefits. This section extends the static framework to a multi-period setting in which adoption speed is endogenous to the price differential.

5.1 Adoption Dynamics

When a credible alternative becomes available, lenders do not switch instantaneously. Large originators grow alternative-score volume in stages, piloting on a subset of applications, expanding to additional channels, and eventually reaching their target allocation. Mid-size lenders adopt more completely once they clear internal governance processes, but the approval cycle itself takes time. Both mechanisms respond to price urgency: a larger price differential between incumbent and entrant accelerates adoption by strengthening the business case at every decision point within the lender organization.

We model this as a partial adjustment process. Let $A(t) \in [0, 1]$ denote the industry-wide share of TMPs using the alternative score at time t, and let $a(p_f)$ denote the long-run target adoption from the static model (equation 1). Actual adoption evolves according to

$$\frac{dA}{dt} = \lambda(\Delta p) \left[a(p_f(t)) - A(t)\right], \tag{5}$$

where $\Delta p = p_f - p_v$ is the price differential and $\lambda(\Delta p)$ is an adoption speed function, increasing in the price gap:

$$\lambda(\Delta p) = \lambda_0 + \lambda_1 \cdot \Delta p. \tag{6}$$

Equation (5) is a simple diffusion equation, identical to heat diffusion. In an economics context, it is a partial adjustment specification in the tradition of Nerlove [9], with the adoption speed endogenous to the price differential following Mansfield [6]'s finding that the rate of inter-firm technology diffusion increases with the profitability of adoption. The parameter λ_0 captures the base rate of institutional decision-making, the speed at which lenders would transition even at a modest price advantage. The parameter λ_1 captures the urgency effect: larger price differentials compress internal timelines. At the current price gap of $27 per TMP, the central calibration ($\lambda_0 = 0.3$, $\lambda_1 = 0.05$) implies a convergence rate of approximately 1.65 per year, consistent with industry expert expectations of a roughly two-year adoption ramp under stable pricing.[1]

A critical institutional feature constrains the lower bound on transition time. Credit score vendors integrated with the major loan origination systems have largely completed technical preparation for multi-score delivery. This vendor readiness means that the operational floor on adoption response may be as short as six months, the time required for lender-side testing and regulatory notification, not for vendor development. At a price differential of $87 per TMP (corresponding to a hypothetical incumbent price of $100), the model implies $\lambda(87) \approx 4.65$ per year, or approximately 90% convergence within six months, consistent with this institutional floor.

Two properties of equation (5) merit emphasis. First, adoption exhibits path dependence: a lender that has incurred the switching cost s and integrated the alternative score into its workflow does not reverse course if the incumbent subsequently reduces price, but still above the alternative score's price. The sunk nature of switching costs creates an asymmetry in which above-equilibrium incumbent pricing during the transition permanently elevates the entrant's market share relative to the long-run target $a(p_f^*)$. Second, because adoption speed increases with the price gap, any above-equilibrium price triggers an accelerating loss of market share.

5.2 Incumbent Multi-Period Pricing

If the incumbent maximizes the net present value of scoring revenue over the transition horizon under previously stated assumptions, taking into account the adoption response produces the *Price-Adoption Equilibrium* (PAE) equation:

$$\max_{\{p_f(t)\}} \sum_{t=0}^{T} \delta^t \, Q(t) \, p_f(t) \left[1 - A(t)\right], \tag{7}$$

subject to the adoption dynamics in equation (5), where $\delta = 1/(1+r)$ is the quarterly discount factor and $Q(t)$ is the volume of TMPs. The incumbent controls price each period, understanding that higher prices increase per-TMP revenue on retained volume but accelerate the erosion of that volume through adoption.

To identify the PAE optimal price path given the previous assumptions, we solve equation (7) by backward induction over a discretized state space [1, 4]. The state variable is the current industry adoption share $A(t)$, discretized into 301 grid points on $[0, 1]$. The control variable is the incumbent price $p_f(t)$, discretized into 181 grid points on $[\$5, \$50]$ per TMP. At each quarterly time step, working backward from a 20-year horizon, the algorithm selects the price that maximizes the sum of

[1] The adoption timeline and the characterization of large-lender staged adoption versus mid-size lender governance-driven adoption derive from interviews with industry experts with direct operational experience in multi-score implementation.

current-period revenue and the interpolated continuation value at the resulting next-period adoption state. The 20-year solution horizon is sufficiently long that end-of-horizon effects do not influence the reported results. The procedure is repeated independently for each of the 25 risk-premium parameter combinations in the grid, yielding a family of optimal price paths and corresponding adoption trajectories.

We compare the PAE optimal solution against two alternative strategies:

PAE optimal. The globally optimal price path obtained by backward induction over the full space of feasible price sequences. Across all parameterizations examined, this solution coincides with immediate repricing to the static equilibrium price from the first period.

Current price. The incumbent maintains its current price of $30 per TMP throughout the horizon. This represents a status-quo strategy in which FICO does not respond to competitive entry at all. The $27 price differential persists, and all savings arise through direct substitution by lenders who switch to the $3 alternative.

Price growth. The incumbent continues its historical pricing trajectory, increasing price at a compound annual growth rate of 19% from $30 in 2026, reaching approximately $36 in 2027, $42 in 2028, $51 in 2029, and $85 by 2032. This scenario reflects the pricing trajectory implied by FICO's Scores revenue growth over recent fiscal years [10, 8] and represents a continuation of observed behavior rather than a hypothetical construct.

5.3 Results

Figure 5 reports the transition dynamics under all three strategies: incumbent price path and industry adoption (panels a–b), and per-TMP cost and savings (panels c–d). Shaded bands indicate the 10th–90th percentile range across a 25-point risk-premium grid ($\mu \in \{8, 10, 12, 14, 16\}$ \$/TMP, $\sigma \in \{5, 8, 12, 16, 20\}$ \$/TMP; all 25 combinations).

PAE optimal strategy is immediate repricing. The central result of the transition analysis is that backward induction over the full space of feasible price sequences selects immediate repricing to the static equilibrium (approximately $11 per TMP) from the first period (Figure 5a). Across all risk-premium parameterizations, the globally optimal price path given the stated assumptions coincides with the static equilibrium price to within the discretization grid ($0.25). The model identifies no extraction window: the PAE optimal strategy is to move to equilibrium immediately and hold, retaining approximately 82% market share with moderate adoption by the entrant.

Holding at $30 drives substantial adoption. If FICO maintains its current $30 price, the $27 differential drives rapid adoption of the alternative score (Figure 5b). Under the central risk-premium assumptions, adoption reaches approximately 94% by 2032. Savings arise entirely through the substitution channel: lenders who switch pay $3 instead of $30. The blended TMP cost declines from $30 to approximately $5 per TMP at the central parameterization (Figure 5c), generating terminal per-TMP savings of approximately $25 (10th–90th percentile: $23–$26).

Continued price increases accelerate market share loss. Under the price-growth scenario, incumbent price rises from $30 to approximately $85 per TMP by 2032 (Figure 5a). This widening price gap drives adoption above 99%: under the central parameterization, adoption exceeds 99% by 2030 (Figure 5b). The blended TMP cost initially rises above the pre-entry baseline (temporarily

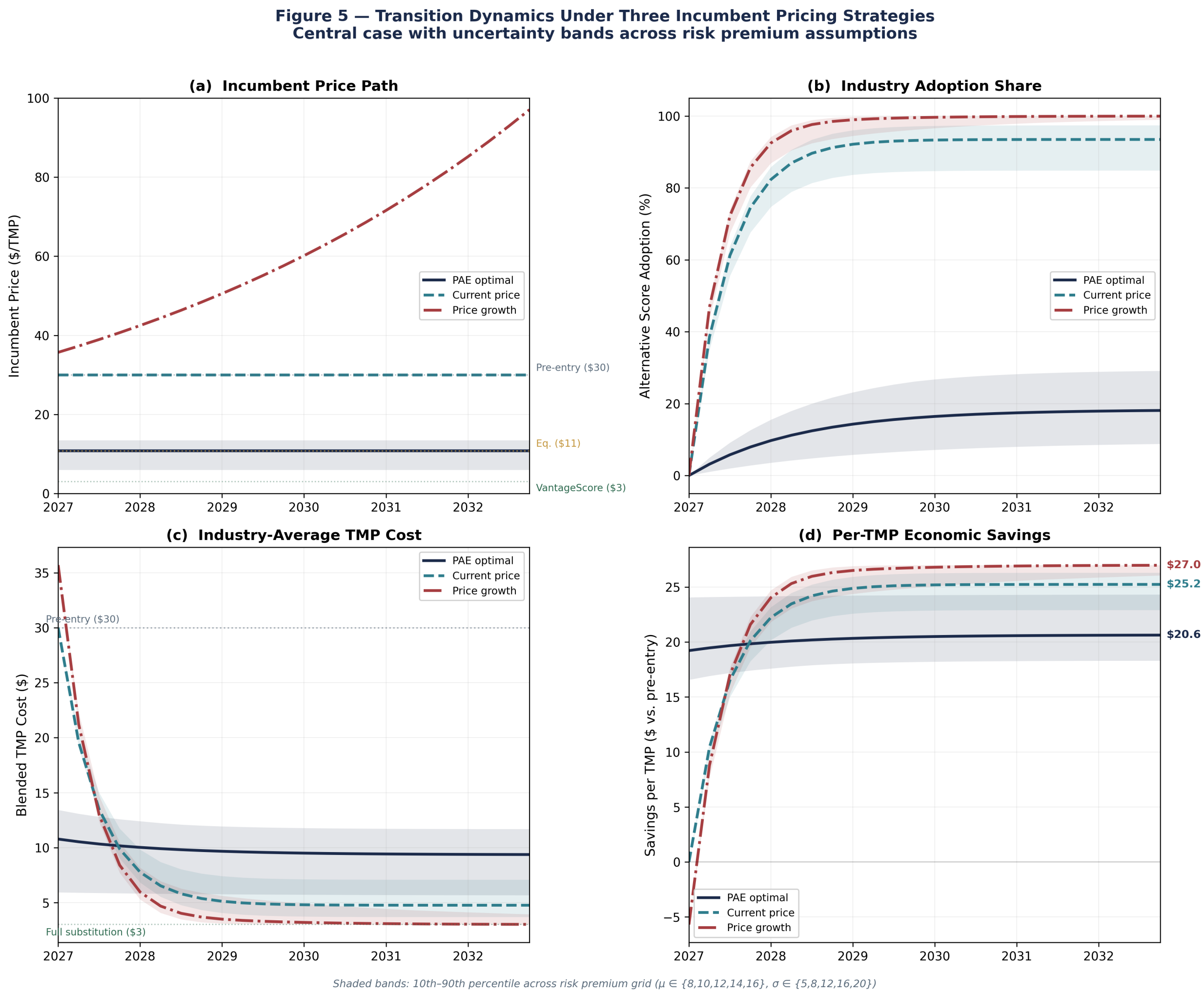

Figure 5: Transition dynamics under three incumbent pricing strategies. Panels (a)–(b): price path and adoption share. Panels (c)–(d): blended TMP cost and per-TMP savings. Solid lines: central case ($\mu = 12$, $\sigma = 8$). Shaded bands: 10th–90th percentile across 25 risk-premium parameter combinations ($\mu \in \{8, 10, 12, 14, 16\}$ \$/TMP, $\sigma \in \{5, 8, 12, 16, 20\}$ \$/TMP).

increasing costs to mortgage originators) before adoption drives the blended cost below $5 per TMP. Terminal per-TMP savings reach approximately $27 at the central parameterization.

Per-TMP savings are robust across strategies. Figure 5d shows that all three strategies produce substantial per-TMP savings relative to the pre-entry baseline. The PAE optimal strategy generates savings primarily through price compression (the incumbent drops from $30 to $11), while the current-price and price-growth strategies generate savings through actual substitution as adoption drives the blended cost below the incumbent's price. Terminal per-TMP savings range from $20.63 to $27.00 at the central parameterization, with the uncertainty bands spanning approximately $18–$27 across the grid. The composition of savings varies by strategy. Under the PAE optimal path, savings arise predominantly from price compression; under the other two, savings arise predominantly from substitution. The total magnitude is comparable or larger under all alternatives.

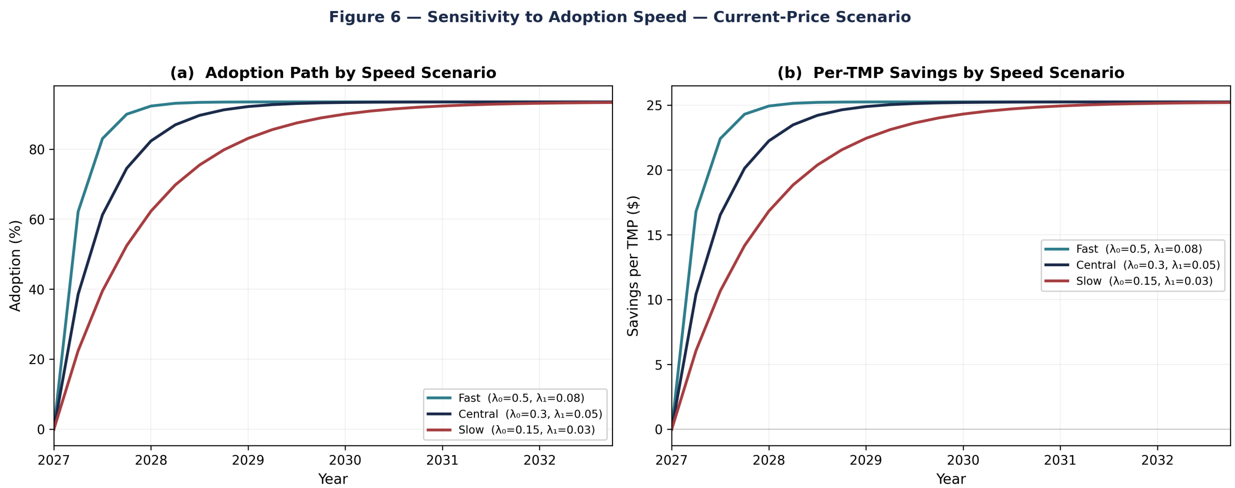

Figure 6: Sensitivity of adoption and per-TMP savings to adoption speed parameters under the current-price scenario. Fast: $\lambda_0 = 0.5$, $\lambda_1 = 0.08$. Central: $\lambda_0 = 0.3$, $\lambda_1 = 0.05$. Slow: $\lambda_0 = 0.15$, $\lambda_1 = 0.03$.

Figure 6 reports the sensitivity of adoption and per-TMP savings to the adoption speed parameters under the current-price scenario. Faster adoption accelerates the realization of savings but does not substantially change the terminal outcome, because all speed scenarios converge toward the same long-run equilibrium. The cumulative savings differential between fast and slow adoption is approximately 15% at the six-year horizon, narrowing over time.

6 Mortgage Origination Volumes and Per-Loan Economic Impact

The preceding sections characterize equilibrium and transition outcomes in terms of price per TMP. This section translates those results into per-loan costs and aggregate economic savings using projected GSE-conforming origination volumes.

6.1 Origination Volume Projections

We combine two forecast sources to construct a quarterly volume path for GSE-conforming mortgage originations through 2032. The Fannie Mae Housing Forecast (January 2026) and the Mortgage Bankers Association Mortgage Finance Forecast (January 2026) provide total market origination projections through 2027 and 2028, respectively. We overlay GSE market share estimates derived from the Urban Institute Housing Finance Policy Center chartbooks and calibrated to the FHFA's reported combined Fannie Mae and Freddie Mac single-family acquisition volume of $672 billion in 2024 on a total market of $1.67 trillion (40% GSE share). Because total origination volume is projected to recover faster than GSE volume, the GSE share declines to 37% by 2027 (2.1 million GSE-conforming originations out of 5.7 million total). Projecting forward with a gradual recovery in GSE share as mortgage rates normalize, the baseline anticipates GSE-conforming originations rising to 2.4 million annually by 2030.[2]

6.2 TMP per Closed Mortgage

A mortgage origination involves multiple potential pull events across the application lifecycle: initial pre-qualification inquiries, which may be soft pulls or limited bureau pulls not involving a full TMP; pre-approval pulls by one or more lenders as a borrower shops rates; the formal application pull; and in some cases a refresh pull shortly before closing. Compounding this, a substantial fraction of pulls occur on applications that do not close, borrowers who are declined, withdraw, or choose a competing lender. The blended ratio of total TMP volume to closed loans therefore reflects all of these pathways simultaneously: the mix of pull types across the pipeline, the number of lenders a typical borrower engages, and the fallout rate between application and closing.

From equity analyst models of FICO's mortgage Scores segment revenue, MBA origination forecasts, and published per-score pricing [10, 8], the forecast of 87,450,000 total scores divided by an average of 5,771,000 closed loans yields 15.15 scores per closed loan; dividing by 3 bureau scores per TMP gives $87{,}450{,}000/(5{,}771{,}000 \times 3) \approx 5.05$ TMP per closed loan. We use 5 throughout the analysis.

At a pre-entry price of $30 per TMP, the TMP cost embedded in a single mortgage is $150. These costs are a component of the all-in cost of origination, whether passed through as fees, lender pricing adjustments, discount points, or rate-sheet markups. The specific pass-through channel varies by lender and competitive circumstance, but reductions in TMP costs flow through to the mortgage industry via one mechanism or another.

6.3 Per-Loan TMP Cost Under Competition

Figure 7 translates the transition dynamics of Section 5 into per-loan terms, with uncertainty bands across the risk-premium grid. At five TMPs per mortgage, the TMP cost per loan evolves as follows under each incumbent pricing strategy:

Pre-entry baseline: $150 per mortgage (5 $\times$ $30).

PAE optimal: The incumbent's immediate move to $11 reduces the blended TMP cost to approximately $47 per mortgage, a saving of $103 per loan (10th–90th percentile: $92–$122). Under this strategy, savings derive primarily from price compression, with moderate adoption.

[2] Volume projections and GSE share assumptions are documented in the companion data appendix. The Fannie Mae / Freddie Mac split is held at 48/52, consistent with 2024 acquisition volumes.

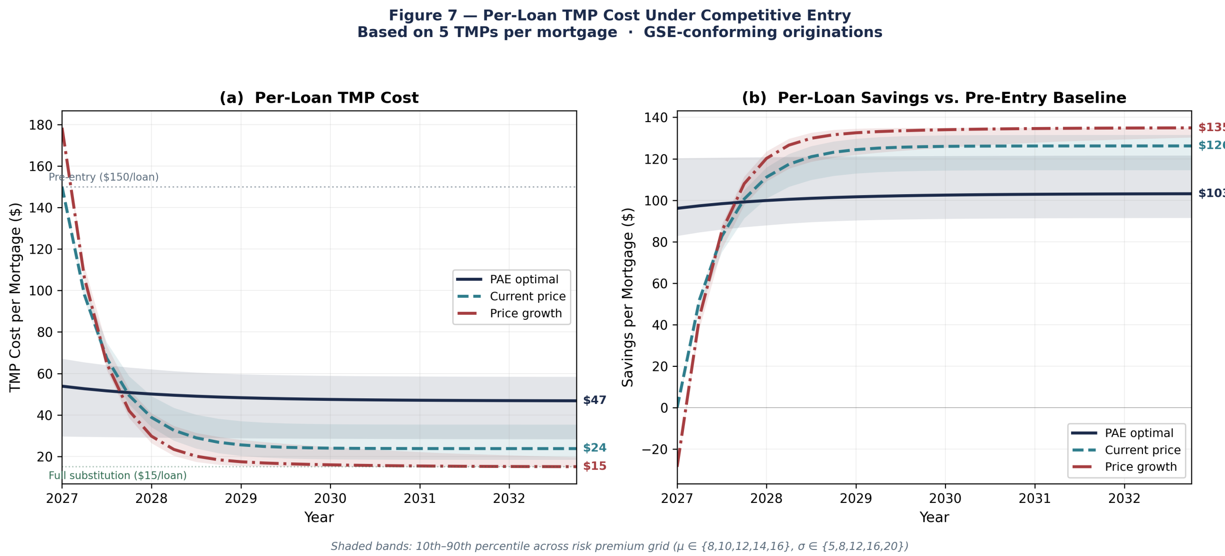

Figure 7: Per-loan TMP cost and savings at 5 TMPs per mortgage under three incumbent pricing strategies. Shaded bands: 10th–90th percentile across risk-premium grid.

Current price: FICO maintains its current price and the $27 differential drives rapid adoption. The per-loan cost declines from $150 to approximately $24, saving $126 per mortgage at the terminal date (10th–90th percentile: $115–$132). Savings arise entirely through the substitution channel as lenders migrate to the $3 alternative.

Price growth: Continued price increases temporarily raise the per-loan cost above the pre-entry baseline in the first year, before high adoption drives the blended cost toward the full-substitution floor. Terminal savings reach $135 per mortgage (10th–90th percentile: $130–$135), but at the cost of a temporary increase in origination expense during the initial period.

Full substitution: If all TMP migrate to the entrant at $3, the TMP cost falls to $15 per mortgage, a maximum saving of $135 per loan.

6.4 Aggregate Economic Savings

Figure 8 reports aggregate annual and cumulative savings across all GSE-conforming originations, with uncertainty bands on the cumulative path.

At projected volumes of 2.1–2.4 million loans per year, competitive entry generates annual economic savings of $200–$320 million, accumulating to $1.2 billion–$1.7 billion over the 2027–2032 horizon depending on the incumbent's pricing response and risk-premium assumptions (Figure 8b). These figures cover only GSE-conforming originations. Under equivalent pricing and adoption assumptions, extending the analysis to the remainder of the mortgage market (FHA/VA, jumbo, and non-QM originations, representing approximately 63% of total origination volume) would imply additional annual savings of approximately $340–$550 million, for a total industry savings of $500–$900 million per year.

Three features of the aggregate results merit emphasis. First, the savings are large in absolute terms. An annual reduction of $200–$320 million in TMP costs represents a meaningful decrease in the frictional cost of mortgage origination. Second, the savings are robust: the range across

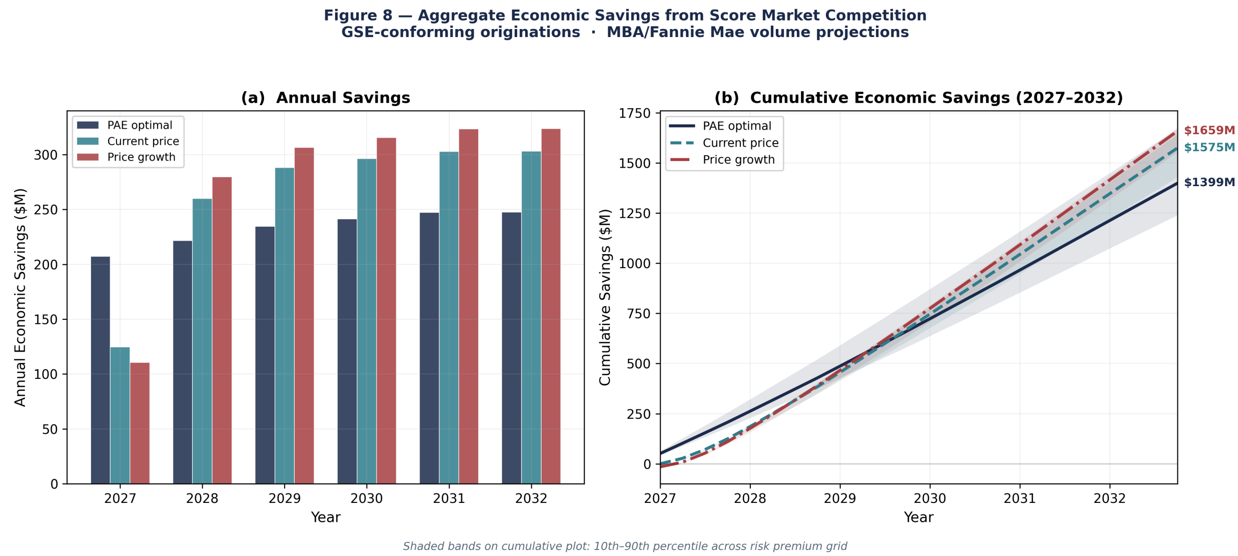

Figure 8: Aggregate annual and cumulative economic savings from score market competition across GSE-conforming originations. MBA/Fannie Mae volume projections applied. Shaded bands on cumulative plot: 10th–90th percentile across risk-premium grid.

incumbent pricing strategies is relatively narrow because the competitive mechanism operates through price discipline regardless of the specific adoption share achieved. Third, under the PAE optimal strategy, savings begin immediately upon competitive entry and accumulate steadily. Under the current-price scenario, savings ramp as adoption builds over the first two years. Under the price-growth scenario, the incumbent's rising price temporarily increases origination costs before high adoption drives the blended cost below the pre-entry baseline—a transition cost that is recovered within approximately one to two years as the competitive mechanism takes effect.

7 Conclusions and Implications

The analysis presented in this study characterizes the equilibrium pricing, transition dynamics, and aggregate economic outcomes that would follow from accepting VantageScore as a competitive alternative to FICO in the conforming mortgage credit score market. The model is deliberately parsimonious. It requires only observable market prices, a calibrated switching friction, and a distributional assumption on unobservable lender risk aversion. Where parameters are uncertain, the grid-sweep methodology and uncertainty bands map every conclusion to the full space of plausible assumptions rather than relying on point estimates.

The model is equally limited in scope. It considers only direct price competition and the resulting adoption dynamics. No consideration is given to other mortgage industry impacts, such as possible expansion of the conforming mortgage market, competitive reductions in mortgage APR, or the need for mortgage insurance. Therefore, all results presented here should be read as a subset of the total potential economic savings, although hopefully this captures the largest component.

The following results emerge that are relevant to the score acceptance decision.

1. Competitive entry disciplines incumbent pricing under all examined assumptions. The $27 price differential between FICO ($30/TMP) and VantageScore ($3/TMP) is large relative to implementation friction (maximum $2/TMP amortized). Even after accounting for substantial lender risk aversion (mean risk premia as high as $20/TMP, with standard deviations up to $30/TMP) the model's equilibrium incumbent price is invariably below the current $30 level. The equilibrium incumbent price ranges from $5 to $19 depending on assumptions, but never reaches or exceeds the status quo price, so long as VantageScore remains at $3.

2. Economic benefits are robust and arise under every incumbent strategy. Savings are positive across all parameter combinations and all incumbent pricing strategies examined, ranging from 42% to 90% of baseline scoring expenditure. The composition of savings depends on the incumbent's response: if the incumbent reprices to equilibrium, savings arise primarily from price compression with adoption remaining below 45%; if the incumbent holds or raises price, savings arise primarily from direct substitution as adoption increases. In either case, total savings are comparable in magnitude.

3. Per-loan savings are economically meaningful. The number of TMPs per closed mortgage varies with market conditions, ranging from approximately three during refinance-dominated periods to six or more during down market periods. At the upper end of this range (5 TMPs), competitive entry reduces per-loan TMP costs by $92–$122 under the PAE optimal strategy and $115–$132 under the current-price scenario (10th–90th percentile across risk-premium assumptions). At the lower end (3 TMPs), these figures scale proportionally to $55–$73 and $69–$79 respectively, still meaningful relative to other per-loan origination costs. Applied to projected GSE-conforming origination volumes of 2.1–2.4 million loans per year, annual savings range from approximately $120 million under the most conservative assumptions (3 TMPs, high risk aversion) to $1.7 billion cumulative under the central case (5 TMPs), averaging $200 million to $280 million per year depending on market conditions and incumbent response.

4. Economic savings arise under all incumbent responses. The analysis evaluates the full range of incumbent pricing behavior, not only the equilibrium response, but also alternative pricing paths. Under competitive entry, the incumbent faces three broad choices, each of which produces positive economic savings. The transition dynamics analysis (Section 5) examines representative scenarios in each category:

1. *Reprice to $5–$19* (Figures 1–3): retain 55–100% of volume through price compression, creating savings of 42–83% of baseline scoring expenditure.
2. *Hold price at $30* (Figure 4a, Figure 5): lose 75–99% of volume to substitution over time, creating savings of 67–89%. Savings arise entirely through the direct substitution channel.
3. *Continue raising price* (Figure 5): lose significant volume to substitution within two to three years, creating the largest absolute savings but also the largest temporary cost increase during the transition. This strategy produces the lowest incumbent cumulative revenue of any examined.

Every path leads to positive economic savings. The only degree of freedom is how the savings decompose between price compression and direct substitution. Under the equilibrium response, the dominant channel is price compression; under the alternative strategies, the dominant channel shifts to direct substitution.

Within the scope of the present framework, the results support the proposition that authorizing VantageScore as a competitive market participant would generate positive and robust economic savings for the mortgage industry. Introducing a credible lower-priced alternative introduces price discipline in the incumbent market. The transition analysis demonstrates that this conclusion holds not only in long-run equilibrium but also along every alternative path.

7.1 Assumptions and Next Steps

The model is intentionally focused, and its assumptions and boundaries should be understood by any reader evaluating the results.

Calibrated, not estimated. Parameters governing the risk-premium distribution are varied over a grid of plausible values rather than econometrically estimated from micro-level lender data. This is appropriate given that no transaction-level dataset of lender switching behavior is currently available. The grid-sweep methodology instead characterizes outcomes across a wide range of assumptions, identifying which conclusions are robust to parameter uncertainty and which are sensitive.

Score interchangeability. The model treats FICO score and VantageScore as functionally interchangeable for the purpose of mortgage origination. Any relative strengths or weaknesses in predictive performance, addressable market size, model stability, regulatory familiarity, or secondary market acceptance are not evaluated here. These considerations are absorbed into the lender-specific risk premium R_i, which captures all non-price reasons a lender might prefer one score over another. The same perspective applies to whether lenders choose the classic or T10 FICO scores.

Fixed entrant pricing. The VantageScore price is held constant at $3 per TMP throughout the analysis. In practice, the entrant could respond to incumbent price changes: a FICO increase might allow VantageScore to raise price modestly without losing significant share, while a FICO price cut might prompt VantageScore to cut price further to claim share. Each of these scenarios expands the analysis with too many unobservable strategic parameters to calibrate credibly. The present framework instead characterizes the first-order competitive effects under the simplifying assumption of a fixed entrant price.

Only per-TMP pricing. FICO offers a second pricing plan that lowers the per-TMP fee to $15/TMP and adds a completion fee of $100 [10]. At the assumed number of 5 TMPs per closed loan, this totals $175, above the $150 under the standard $30/TMP plan. In this study, any per-TMP price changes by FICO can be assumed to represent a blended rate across these or future plans. Any lender-specific plan preferences can be considered to be included in the distribution of risk premia.

Revenue-based objective function. The model determines FICO's equilibrium price by maximizing revenue rather than profit, because FICO's cost structure is unobserved. If marginal costs of score delivery are non-trivial, the profit-maximizing price would differ from the revenue-maximizing price. Since marginal costs for digital score delivery are likely small relative to the per-TMP price, this simplification is conservative: it gives FICO the most pricing flexibility within the model.

No added borrower optionality. Some commenters have suggested that having both scores available for conforming mortgage qualification could expand the pool of eligible borrowers, thereby reducing the interest rate spread on the loan, reducing the need for or price of mortgage insurance, and reducing the cost of interest rate buydowns.

Future work may incorporate additional data for direct estimation of key model assumptions. In particular, score interchangeability and the size of the conforming applicant pool could be formally estimated rather than assumed.

About the Authors

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Dr. Breeden has been designing solutions for lenders since 1996. He founded Deep Future Analytics in 2011, which focuses on portfolio and loan-level forecasting solutions for pricing, account management, CCAR, and CECL / IFRS 9. In 2026 he founded CALM XAI to create explainable and governable language models for business. He has served as President of the Model Risk Managers' International Association (mrmia.org) since 2020. Dr. Breeden holds a Ph.D. in physics, studying chaos theory and machine learning, and has published over 100 academic articles, 9 books, and 24 patents. Dr. Breeden is on the Board of Directors for Upgrade, a San Francisco-based FinTech, GARP's AI Advisory Board, and the editorial boards of the *Journal of Credit Risk*, the *Journal of Risk Model Validation*, the *Journal of Risk and Financial Management*, and *AI and Ethics*.

Charles Maner, Senior Advisor, Deep Future Analytics LLC

Charles Maner has over 30 years of experience in the development, usage, and assessment of retail and commercial risk models. These models span the entire credit life cycle, including underwriting, credit loss estimation, collection prioritization, asset recovery estimation, and asset (real estate) valuation. He has worked in numerous roles within model development and analytics. Charles has held senior leadership in credit risk at Bank of America, BB&T, and most recently Truist Financial Corp., where he served as Head of Model Development for Retail Credit Risk.

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