Impacts of trended data on consumer risk scores

Presenters:

Nick Rose

Jeff Richardson

Federal Reserve Bank of Philadelphia - Fintech 2018

November 13, 2018

VantageScore® 4.0
Available Since Q3, 2017 at all Credit Bureaus

The model:

- Leverage machine learning to more accurately score sparse credit file consumers
- More than 20% of the attributes are tri-CRC leveled trended attributes
- Developed on 14-16 timeframe, using leveled attributes and a consistent algorithm

The performance:

- More predictive than all prior versions of VantageScore®
- Scores more than 30 million consumers compared to conventional models
- Consumer score consistency

Value of Trended Credit Data Attributes in Credit Score Models

Intro: Trended Data

Introduced in 2016, all 3 CRCs have incorporated trade line level ”time series” data spanning the previous 24 months of activity on open trades in a consumers credit file.

Bank (ABC)		Date Opened	11/1/2009	Months Reviewed	49
Industry	BA	Date Closed			
Portfolio Type	R-REVOLVING	Effective Date	4/1/2015	Late Payments at 30	1
Account Type	BC - BANKCARD	Last Payment Date	4/1/2015	Late Payments at 60	0
ECOA Designation	R	Max Delinquency Ratir	2	Late Payments at 90	0
Payment Pattern Start	4/1/2015				
Payment Pattern 1-24	111111211111111111111111				

WAS:

	4/1/2015
Balance	**$8,600**
Credit Limit	**$12,500**
Amount Due	**$215**
Actual Payment	**$1,560**

Now:

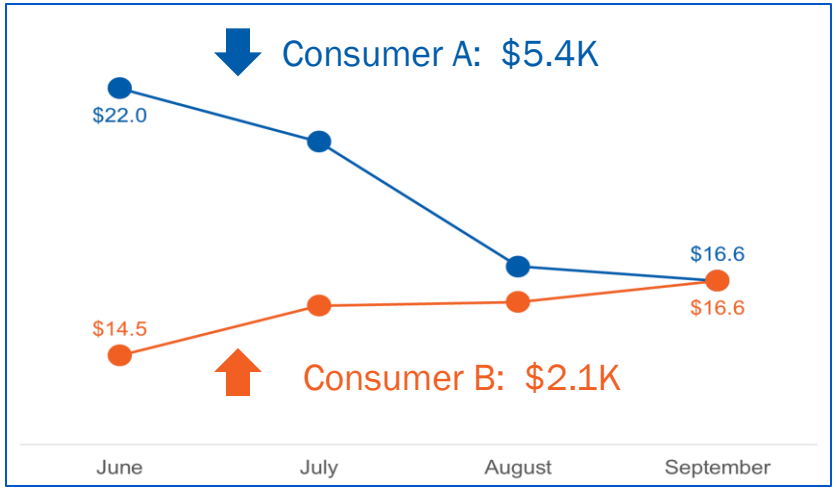
	4/1/2015	3/1/2015	2/1/2015	1/1/2015	12/1/2014	11/1/2014	10/1/2014	9/1/2014	8/1/2014	7/1/2014	6/1/2014	5/1/2014
Balance	**$8,600**	$9,200	$8,905	$7,000	$10,300	$8,600	$8,400	$6,000	$5,200	$6,500	$5,200	$5,800
Credit Limit	**$12,500**	$12,500	$12,500	$12,500	$12,500	$12,500	$12,500	$12,500	$12,500	$12,500	$12,500	$12,500
Amount Due	**$215**	$ 184	$ 178	$ 140	$ 206	$ 172	$ 168	$ 120	$ 104	$ 130	$ 104	$ 116
Actual Payment	**$1,560**	$2,300	$1,600	$5,400	$2,000	$600	$1,400	$ -	$1,350	$3,000	$2,600	$2,280

	4/1/2014	3/1/2014	2/1/2014	1/1/2014	12/1/2013	11/1/2013	10/1/2013	9/1/2013	8/1/2013	7/1/2013	6/1/2013	5/1/2013
Balance	$5,940	$4,100	$3,700	$4,250	$3,300	$3,950	$2,850	$3,300	$2,960	$3,120	$2,300	$2,850
Credit Limit	$12,500	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000
Amount Due	$ 118	$ 82	$ 74	$ 85	$ 66	$ 79	$ 57	$ 66	$ 59	$ 62	$ 46	$ 57
Actual Payment	$2,120	$1,900	$1,250	$1,650	$1,800	$2,200	$1,950	$1,680	$1,485	$2,200	$2,500	$1,680

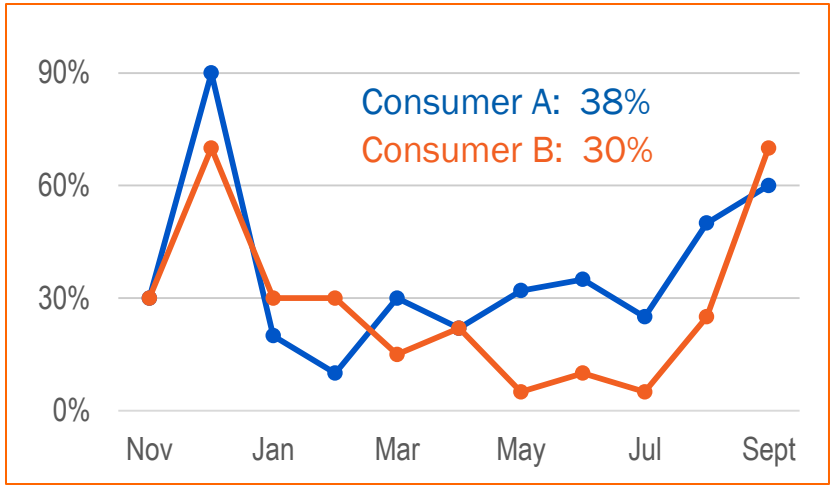
Benefits of Trended Data

Trended credit data contributes to a credit score by assessing the trajectory of credit behaviors. Trends measure the magnitude and direction of a consumer's credit health in the last 3 to 24 months of time.

Balances in past 3 months



Avg. utilization over 12 months



These new attributes will supplement the static, single point-in-time information historically gathered in credit files, offering a more complete view of a consumer's credit behavior.

Scorecard building with trended attributes

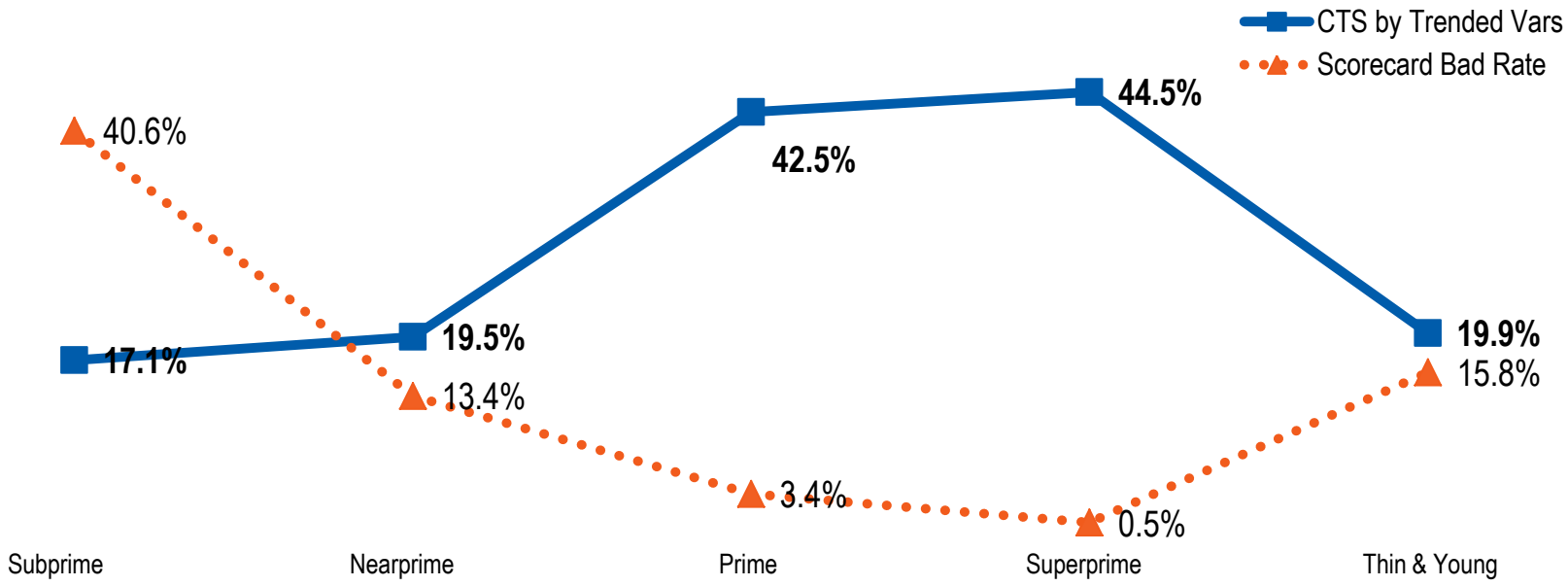
- Over 2000 attributes designed
- Evaluated by credit tier & sparse credit file segments
- Scorecards built with and without trended attributes
  - Predictive contribution
  - Contribution to score

Attribute Design – Examples

Industry	Behavior	Timeframe
First Mortgage	Number credit limit increase/decrease	3 months
Real Estate	Number payments above amount due	6 months
Home Equity	% change in balance	12 months
Installment	Slope of balance, credit limit	24 months
Personal Installment	Start-End % change in balance	
Auto Loan	Average excess payment in $ or % to prior due amount	
Student loan	Average monthly utilization	
Bankcard	Time since most recent over-limit	
Revolving	Number of times over-limit	
Retail	Highest monthly utilization	
	Utilization on highest usage trade	
	Average number of payment as % of balance	
	Number of balance decrease/increase	

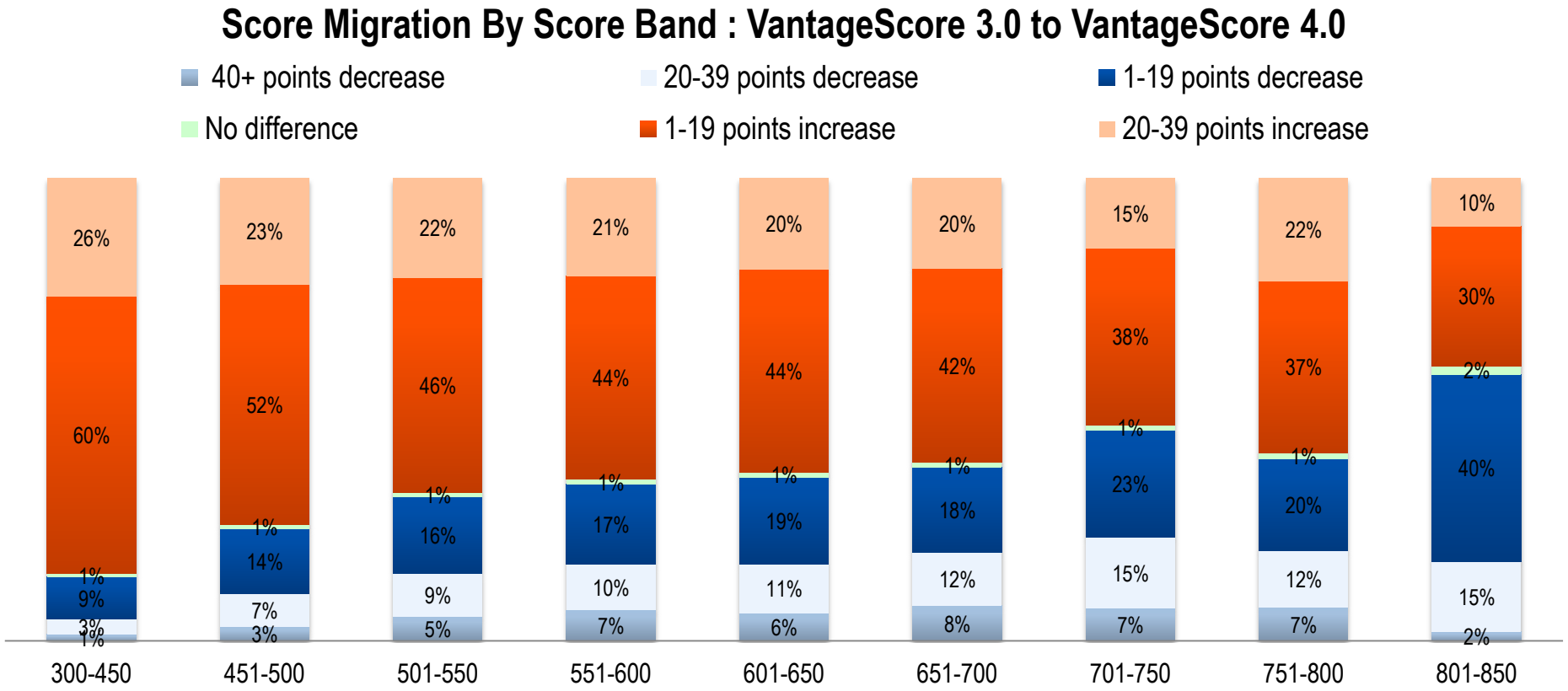
Contribution to Score by Credit Tier

Trended attributes contribution to score, more than doubles in low-risk (Prime and Superprime) scorecards as compared to high-risk (Subprime and Near Prime).



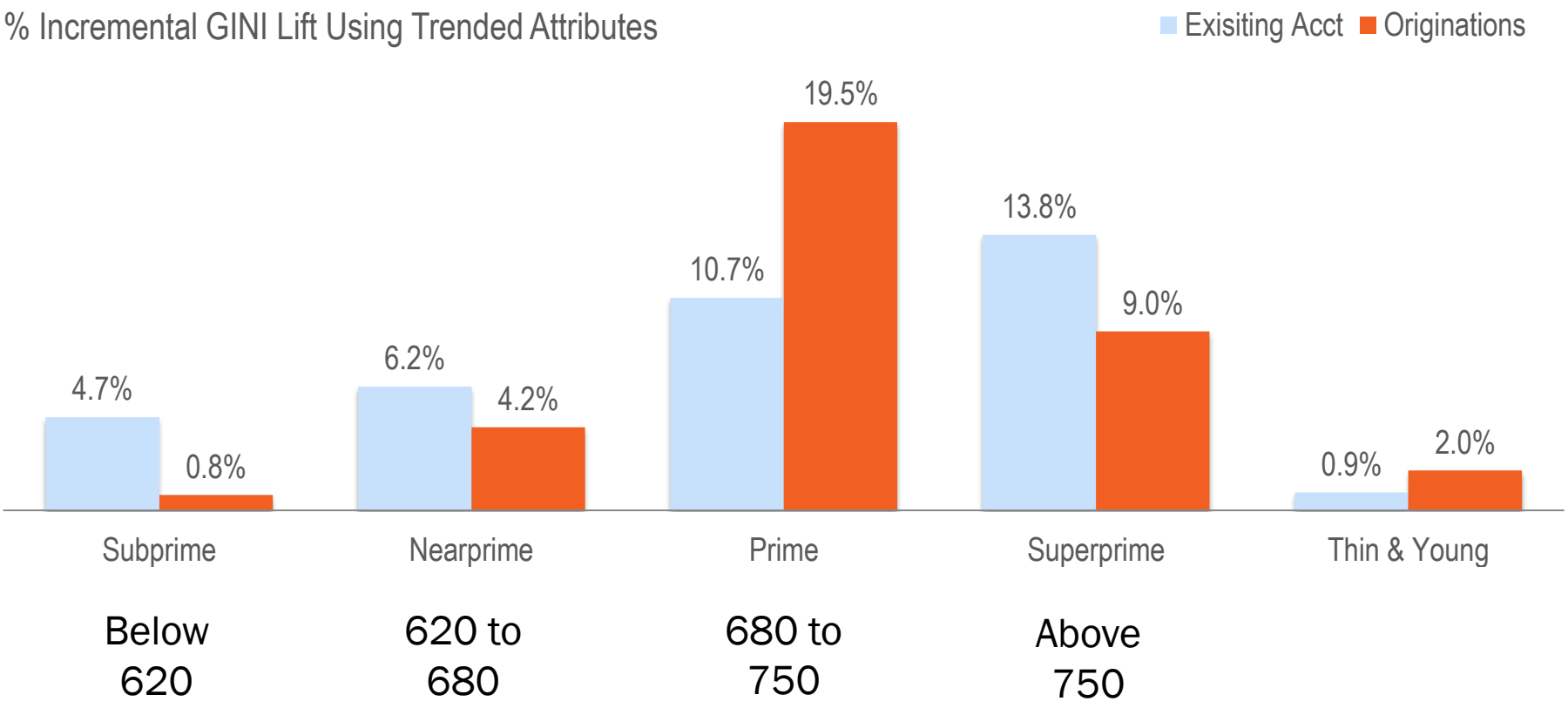
Score Migration

VantageScore 4.0 was aligned to VantageScore 3.0 on the 14-16 timeframe



Predictive Lift by Credit Tier

- Trended attributes substantially improve predictive performance for Prime and Superprime consumers
- Provides a capability to tease out 'bads' in overwhelmingly good populations



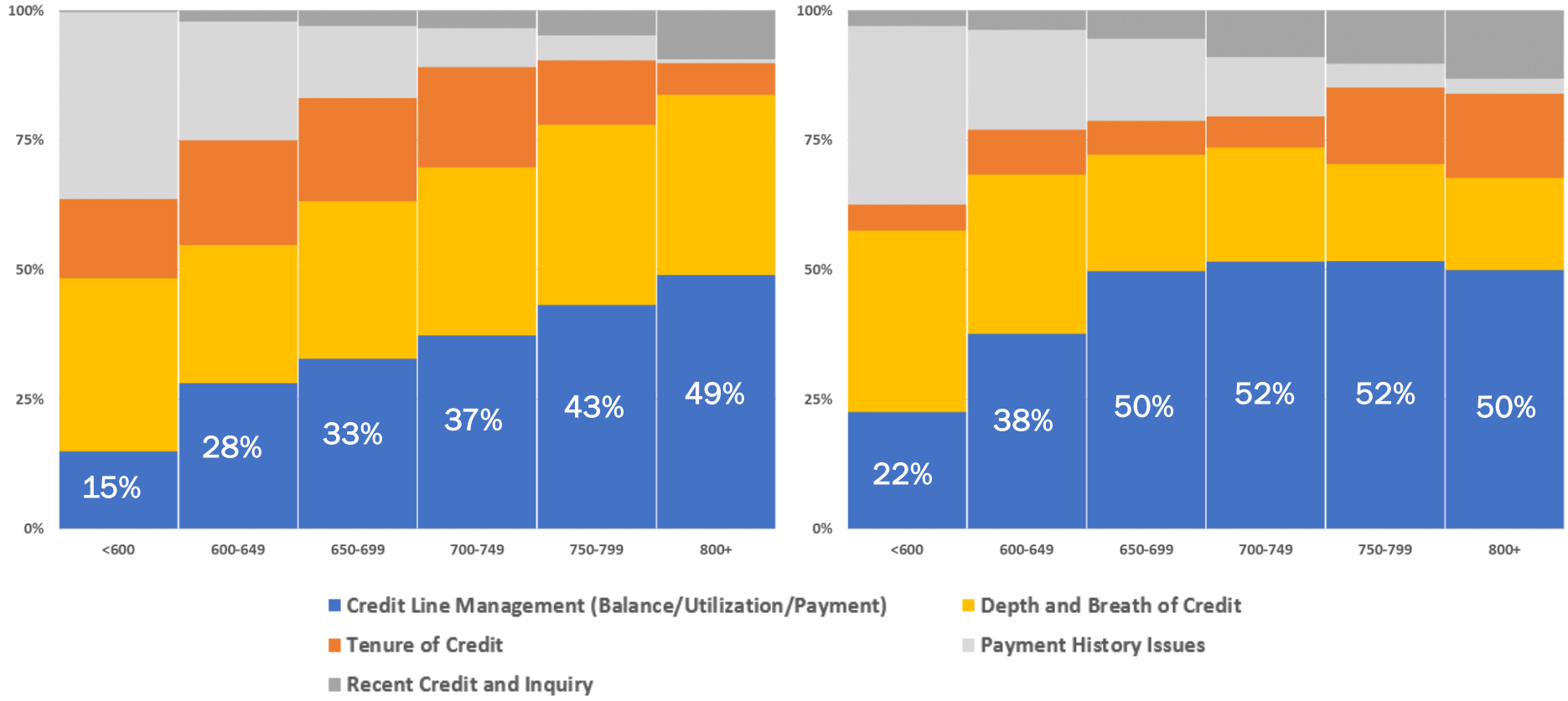
What Changed Using Trended Data?
Changes in Predictive Contributions to Score

VantageScore 3.0

About 50% of predictive contribution comes from Tenure and Depth & Breadth of Credit.

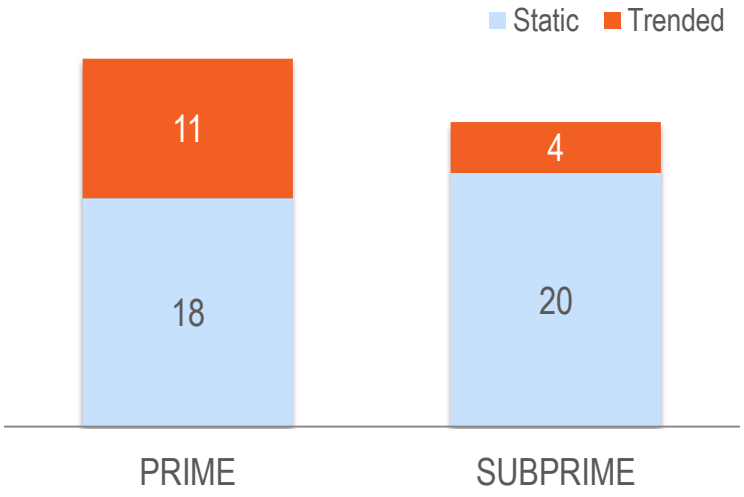
VantageScore 4.0

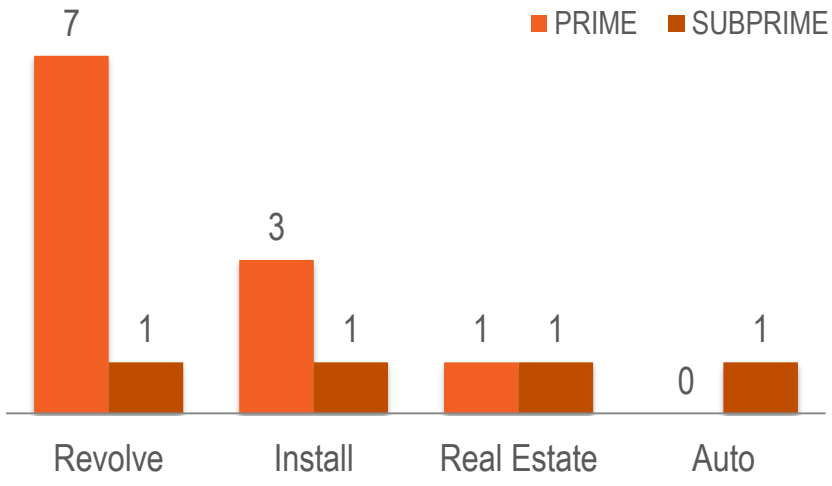
About 50% of predictive contribution comes from core credit line management behaviors.



Trended Attribute Contribution – Comparing Subprime & Prime Scorecards

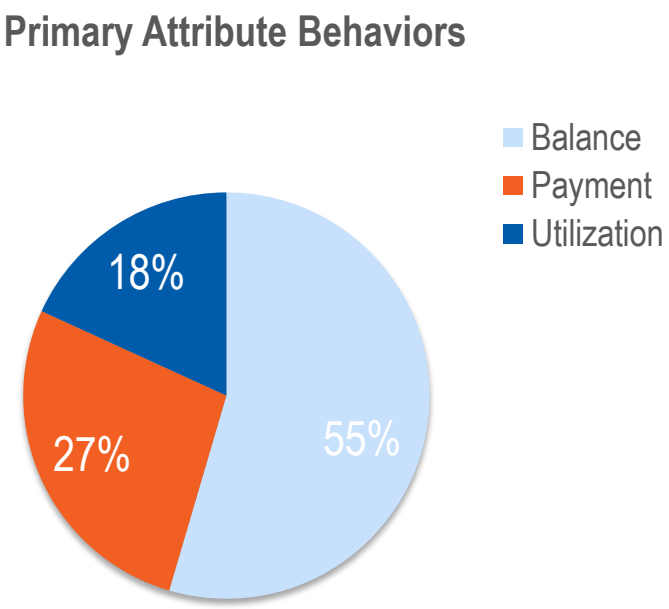
- Trended attributes offer greatest insight where there is less obvious high risk behavior, providing a capability to tease out 'bads' in overwhelmingly good populations.
- For Subprime consumers, contemporaneous payment-related attributes continue to be most relevant

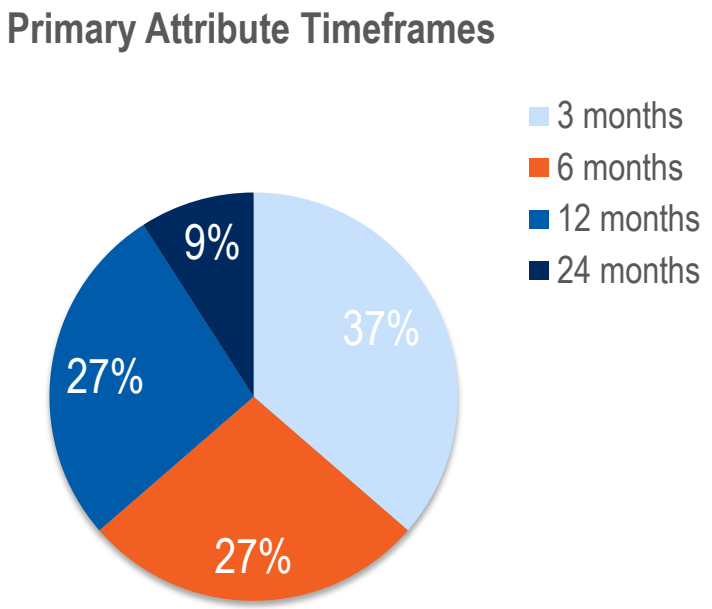




Attribute Contribution – Prime

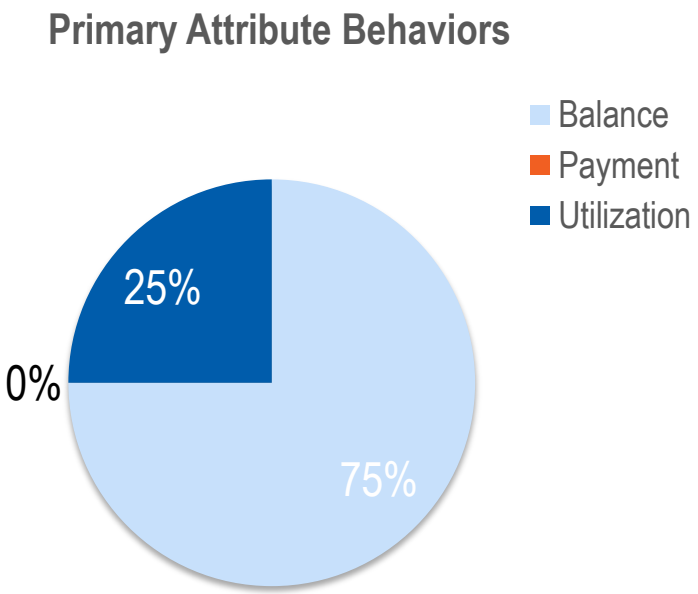
Balance related behavioral attributes over a 3-12 month periods were most prevalent

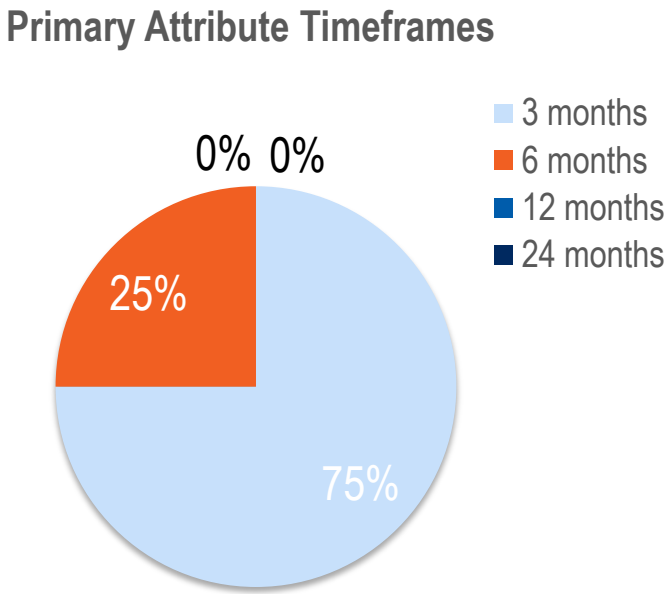




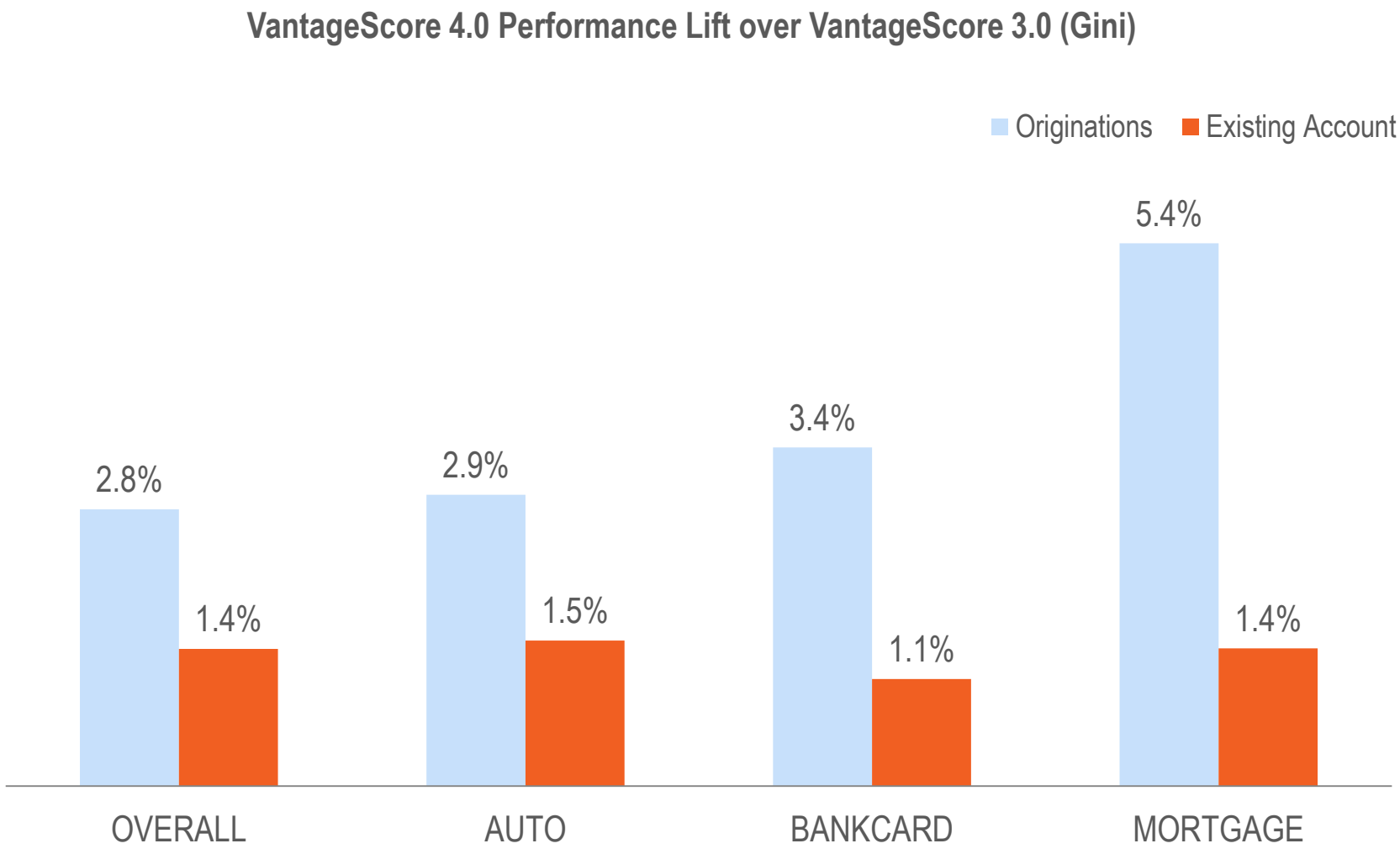
Attribute Contribution – Subprime

Balance changes and high utilization events over the prior three months were relevant





Performance – Mainstream Consumers



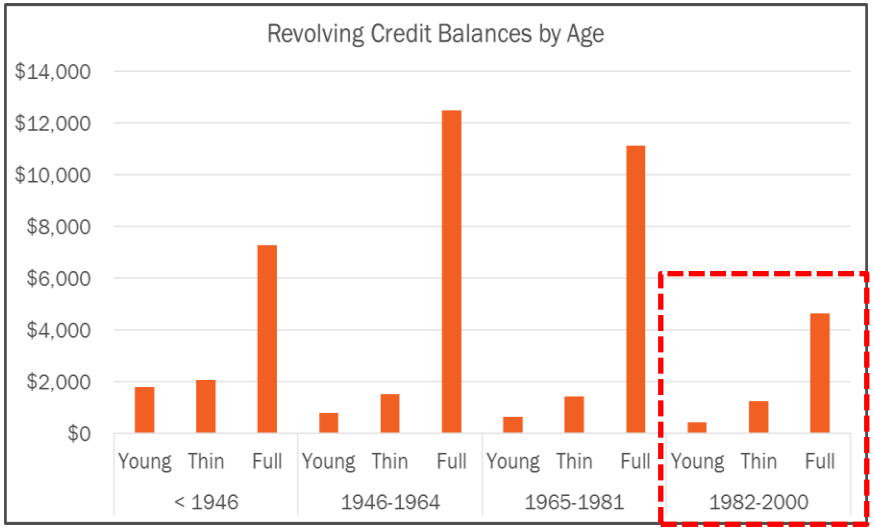
Current Millennial Credit Usage

		Average			VantageScore 3.0 Range %				
	Credit Usage	Income	Assets	% of Co-hort	< 500	500-599	600-699	700-799	800+
< 1946 (WWII Gen)	Young	$ 96,004	$ 481,770	0.3%	2.4%	14.9%	44.3%	38.3%	0.0%
	Thin	**$ 106,400**	**$ 717,905**	**18.1%**	**0.6%**	**3.3%**	**8.7%**	**87.4%**	**0.0%**
	Full	**$ 90,281**	**$ 864,296**	**39.6%**	**0.5%**	**4.1%**	**11.4%**	**36.6%**	**47.4%**
1946-1964 (Baby Boomers)	Young	$ 73,521	$ 298,118	0.3%	9.0%	28.2%	46.3%	16.4%	0.0%
	Thin	**$ 80,807**	**$ 405,402**	**5.7%**	**8.0%**	**21.3%**	**22.7%**	**48.0%**	**0.0%**
	Full	**$ 112,808**	**$ 625,635**	**79.8%**	**1.5%**	**9.4%**	**20.5%**	**34.1%**	**34.4%**
1965 - 1981 (Gen X)	Young	$ 77,396	$ 204,828	0.6%	8.8%	27.8%	48.7%	14.6%	0.0%
	Thin	**$ 76,522**	**$ 192,575**	**7.8%**	**14.8%**	**29.6%**	**22.8%**	**32.8%**	**0.0%**
	Full	**$ 116,692**	**$ 314,884**	**76.8%**	**4.1%**	**18.4%**	**27.2%**	**34.1%**	**16.2%**
1982-2000 (Millenials)	**Young**	$ 87,176	$ 182,272	3.2%	4.4%	37.9%	46.4%	11.3%	0.0%
	Thin	**$ 89,015**	**$ 201,820**	**21.2%**	**12.1%**	**25.2%**	**30.3%**	**32.4%**	**0.0%**
	Full	**$ 88,622**	**$ 146,705**	**58.3%**	**6.3%**	**21.5%**	**29.6%**	**37.9%**	**4.7%**

Millennials have student loans and are reluctant to add any more debt. This is good credit management.

Age Co-Hort	Credit Usage	Auto Loan	Credit Card	Personal Installment	Student Loan	Mortgage	Revolving
< 1946	Young	0.04	0.59	0.04	0.01	0.02	0.87
	Thin	0.02	0.68	0.01	0.02	0.03	1.14
	Full	1.06	5.17	0.69	0.10	0.96	9.90
1946-1964	Young	0.15	0.55	0.12	0.03	0.01	0.72
	Thin	0.19	0.55	0.10	0.11	0.11	0.97
	Full	2.04	5.68	1.22	0.47	1.74	11.16
1965 - 1981	Young	0.17	0.64	0.11	0.06	0.01	0.78
	Thin	0.26	0.56	0.13	0.29	0.06	0.83
	Full	2.28	4.88	1.32	1.44	1.49	9.36
1982-2000	Young	0.14	0.50	0.07	0.48	0.00	0.64
	Thin	0.21	0.64	0.08	1.24	0.01	0.82
	Full	1.45	3.00	0.87	2.88	0.35	5.28

Moreover, Millennials Also Aren't Over-Extending Themselves on the Revolving Credit Accounts they Actually Do Have.



Concluding Remarks

Trended attributes have changed the focus of credit scores to better understand credit management behaviors over time versus static snapshots where higher value is placed on tenure and types of credit used.

- In sub prime situations payment history and maxed out credit are the dominating characteristics to determine poor creditworthiness.
- Once these issues are cleared (i.e. no payment history issues on the consumer) trended models consider a consumers credit management behaviors as major factors in determining credit risk.
- Static models never had the ability to see past the most present state of accounts and can only determine the most recent signs of stress on a consumer.
- Static models rely on less prescriptive behaviors such as balance management/payment quality and focus on credit demographics: too few accounts, age of oldest account, etc for determining credit risk.

The newest users of credit, Millennials, have chosen to use credit more prudently? Are they being treated fairly by older static models? Or, should more emphasis should be placed on credit behaviors and recent changes in credit management to determine risk.


VantageScore®
a higher level of confidence