APPENDIX

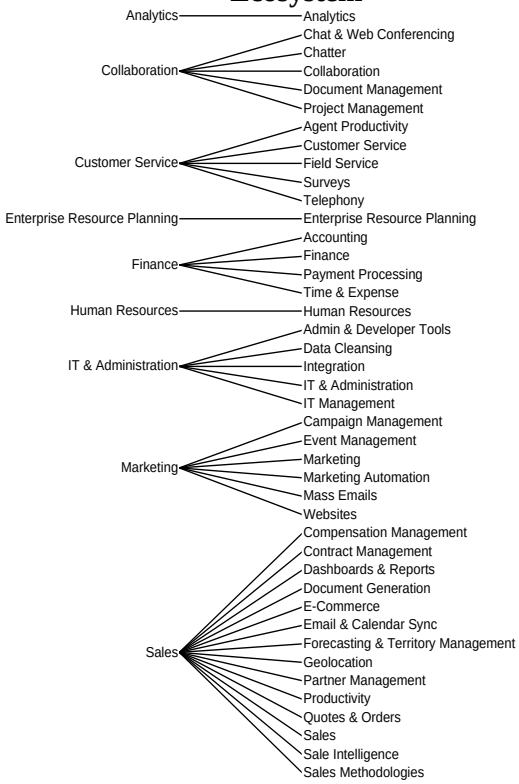
Anchored Inferential Learning: Platform-Specific Uncertainty, Venture Capital Investments by the Platform Owner, and the Impact on Complementors

Appendix A: Information on AppExchange

Appendix B: Additional Quantitative Analyses

Appendix A: Information on AppExchange

Figure A1. Product Category Structure in the AppExchange App Store of the Salesforce Platform Ecosystem



Appendix B: Additional Quantitative Analyses

Table B1. Estimation Results for Falsification Exercises in the App Introduction Analyses

Variable	1	2	3
CVC by other organization in subcategory	-0.000092		
	(0.00017)		
PVC in related subcategory		0.000026	
		(0.00011)	
Placebo PVC in subcategory			0.000049
			(0.00015)
Platform ecosystem experience (ln)	-0.0017***	-0.0017***	-0.0017***
	(0.00015)	(0.00015)	(0.00015)
App introductions in subcategory	-0.000086***	-0.000085***	-0.000085***
	(0.000028)	(0.000028)	(0.000028)
App withdrawals in subcategory	0.000097	0.000098	0.000097
	(0.000072)	(0.000071)	(0.000071)
Apps by platform provider in subcategory	-0.00049***	-0.00049***	-0.00049***
	(0.00017)	(0.00017)	(0.00017)
Subcategory market size (ln)	0.00020	0.00020	0.00020
	(0.00021)	(0.00021)	(0.00021)
Complementor scope	-0.0037***	-0.0037***	-0.0037***
	(0.00025)	(0.00025)	(0.00025)
Apps by complementor in subcategory	0.0036***	0.0036***	0.0036***
	(0.00057)	(0.00057)	(0.00057)
Complementor performance	-0.00021	-0.00021	-0.00021
	(0.00014)	(0.00014)	(0.00014)
Complementor fixed effects	Yes	Yes	Yes
Category fixed effects	Yes	Yes	Yes
Month fixed effects	Yes	Yes	Yes
Number of complementors	1,415	1,415	1,415
Number of observations	761,376	761,376	761,376
R^2	0.0059	0.0059	0.0059

Notes. Coefficients are reported with robust standard errors, clustered at the level of the complementor, in parentheses. The constant is estimated but not reported. Coefficients are from linear probability models estimating the likelihood of app introduction. CVC by other organization in subcategory is a dummy variable capturing whether a complementor in a subcategory received a CVC investment from a corporate investor other than the platform provider. PVC in subcategory is a dummy variable capturing whether a PVC investment happened in a related subcategory but not in the affected subcategory itself (i.e., a subcategory nested in the same main category). Placebo PVC is a dummy variable that takes a positive value in the three months before a PVC investment took place.
* $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$.

Table B2. Estimation Results for Falsification Exercises in the App Withdrawal Analyses

Variable	1	2	3
CVC by other organization in subcategory	0.0026		
	(0.0027)		
PVC in related subcategory		0.0011	
		(0.0012)	
Placebo PVC in subcategory			0.00094
			(0.0018)
Platform ecosystem experience (ln)	-0.0019	-0.0019	-0.0019
	(0.0019)	(0.0019)	(0.0019)
App introductions in subcategory	-0.00011	-0.00011	-0.00011
	(0.00016)	(0.00016)	(0.00016)
App withdrawals in subcategory	0.00066	0.00075	0.00073
	(0.00047)	(0.00050)	(0.00050)
Apps by platform provider in subcategory	-0.0039**	-0.0039***	-0.0038**
	(0.0015)	(0.0015)	(0.0015)
Subcategory market size (ln)	0.0017	0.0016	0.0015
	(0.0041)	(0.0040)	(0.0040)
Complementor scope	-0.0034*	-0.0034*	-0.0034*
	(0.0020)	(0.0020)	(0.0020)
Apps by complementor in subcategory	0.016**	0.016**	0.016**
	(0.0064)	(0.0064)	(0.0064)
App performance	0.0010	0.0010	0.0010
	(0.0024)	(0.0024)	(0.0024)
App age	0.0019	0.0020	0.0020
	(0.0024)	(0.0024)	(0.0024)
Number of ratings (ln)	-0.0061***	-0.0062***	-0.0061***
	(0.0014)	(0.0014)	(0.0014)
Rating valence	0.00091	0.00096	0.00094
	(0.00071)	(0.00071)	(0.00071)
App fixed effects	Yes	Yes	Yes
Month fixed effects	Yes	Yes	Yes
Number of apps	2,158	2,158	2,158
Number of observations	21,893	21,893	21,893
R^2	0.010	0.010	0.010

Notes. Coefficients are reported with robust standard errors, clustered at the level of the app, in parentheses. The constant is estimated but not reported. Coefficients are from linear probability models estimating the likelihood of app withdrawal. CVC by other organization in subcategory is a dummy variable capturing whether a complementor in a subcategory received a CVC investment from a corporate investor other than the platform provider. PVC in subcategory is a dummy variable capturing whether a PVC investment happened in a related subcategory but not in the affected subcategory itself (i.e., a subcategory nested in the same main category). Placebo PVC is a dummy variable that takes a positive value in the three months before a PVC investment took place.

* $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$.

Table B3. Split Sample Analyses Estimating the Effect of PVC on App Introductions for Complementors with and without Access to Venture Financing and for Small and Large Complementors

	Venture Financing			Complementor size		
	Not financed	Financed	χ^2 test	Small	Large	χ^2 test
Variable	**1**	**2**	**3**	**4**	**5**	**6**
PVC in subcategory	0.00036*	0.00046	0.050	0.00034	0.00040*	0.030
	(0.00020)	(0.00038)		(0.00026)	(0.00024)	
Control variables included	Yes	Yes		Yes	Yes	
Complementor fixed effects	Yes	Yes		Yes	Yes	
Subcategory fixed effects	Yes	Yes		Yes	Yes	
Month fixed effects	Yes	Yes		Yes	Yes	
Number of complementors	1,193	242		710	705	
Number of observations	629,790	131,586		382,336	379,050	
R^2	0.0058	0.0059		0.0058	0.0060	

Notes. Coefficients are reported with robust standard errors, clustered at the level of the complementor, in parentheses. Coefficients are from linear probability models estimating the likelihood of app introduction for complementors with and without preexisting access to venture financing and for small and large complementors. Complementors are assigned to the small or large complementor subsample, in terms of number of employees, by means of a median split (Med = 21). Columns 3 and 6 present the results of cross-model hypothesis tests, using the χ^2 test statistic. A significant test statistic indicates that the estimated coefficients across the subsamples are different.

* $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$.

Table B4. Split Sample Analyses Estimating the Effect of PVC on App Withdrawals for Complementors with and without Access to Venture Financing and for Small and Large Complementors

	Venture financing			Complementor size		
	Not Financed	Financed	χ^2 test	Small	Large	χ^2 test
Variable	**1**	**2**	**3**	**4**	**5**	**6**
PVC in subcategory	-0.0036**	-0.0014	0.37	-0.0053**	-0.0014	1.58
	(0.0018)	(0.0033)		(0.0023)	(0.0022)	
Control variables included	Yes	Yes		Yes	Yes	
App fixed effects	Yes	Yes		Yes	Yes	
Week fixed effects	Yes	Yes		Yes	Yes	
Number of apps	1,776	382		1,073	1,085	
Number of observations	17,945	3,948		10,826	11,067	
R^2	0.010	0.028		0.010	0.014	

Notes. Coefficients are reported with robust standard errors, clustered at the level of the app, in parentheses. Coefficients are from linear probability models estimating the likelihood of app withdrawal for complementors with and without preexisting access to venture financing and for small and large complementors. Complementors are assigned to the small or large complementor subsample, in terms of number of employees, by means of a median split (Med = 25). Columns 3 and 6 present the results of cross-model hypothesis tests, using the χ^2 test statistic. A significant test statistic indicates that the estimated coefficients across the subsamples are different.

* $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$.

Table B5. Analyses Comparing the Effect of Different Types of PVC Investments on App Introductions

	Early and late-stage PVC		Lead and syndicated PVC	
	Estimates	**Wald test**	**Estimates**	**Wald test**
Variable	**1**	**2**	**3**	**4**
Early-stage PVC in subcategory	0.00052**	1.59		
	(0.00023)			
Late-stage PVC in subcategory	0.00012			
	(0.00026)			
Lead PVC in subcategory			0.00048*	0.22
			(0.00039)	
Syndicated PVC in subcategory			0.00033	
			(0.00020)	
Control variables included	Yes		Yes	
Complementor fixed effects	Yes		Yes	
Subcategory fixed effects	Yes		Yes	
Month fixed effects	Yes		Yes	
Number of complementors	1,415		1,415	
Number of observations	761,376		761,376	
R^2	0.0059		0.0059	

Notes. Coefficients are reported with robust standard errors, clustered at the level of the complementor, in parentheses. The constant is estimated but not reported. Coefficients are from linear probability models estimating the likelihood of app introduction. Columns 2 and 4 present the results of Wald tests comparing the equality of the estimated coefficients. A significant test statistic indicates that the estimated coefficients are different.

* $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$.

Table B6. Analyses Comparing the Effect of Different Types of PVC Investments on App Withdrawals

	Early and late-stage PVC		Lead and syndicated PVC	
	Estimates	Wald test	Estimates	Wald test
Variable	**1**	**2**	**3**	**4**
Early-stage PVC in subcategory	-0.0031**	0.010		
	(0.0016)			
Late-stage PVC in subcategory	-0.0036*			
	(0.0039)			
Lead PVC in subcategory			-0.0034*	0.010
			(0.0018)	
Syndicated PVC in subcategory			-0.0036*	
			(0.0021)	
Control variables included	Yes		Yes	
App fixed effects	Yes		Yes	
Month fixed effects	Yes		Yes	
Number of apps	2,158		2,158	
Number of observations	21,893		21,893	
R^2	0.010		0.010	

Notes. Coefficients are reported with robust standard errors, clustered at the level of the app, in parentheses. The constant is estimated but not reported. Coefficients are from linear probability models estimating the likelihood of app withdrawal. Columns 2 and 4 present the results of Wald tests comparing the equality of the estimated coefficients. A significant test statistic indicates that the estimated coefficients are different.
* $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$.

Table B7. Ordinary Least Squares Estimates of the Effect of PVC on the Log-Transformed Number of App Introductions

Variable	1	2	3
PVC in subcategory	0.00026*	0.0020***	0.000074
	(0.00014)	(0.00041)	(0.00015)
Platform ecosystem experience (ln)	-0.0015***	-0.0014***	-0.0015***
	(0.00013)	(0.00013)	(0.00013)
PVC in subcategory x platform ecosystem experience (ln)		-0.00062*	
		(0.00011)	
PVC in subcategory x exclusive platform focus			0.00053**
			(0.00025)
App introductions in subcategory	-0.000084***	-0.000085***	-0.000084***
	(0.000022)	(0.000022)	(0.000022)
App withdrawals in subcategory	0.000041	0.000042	0.000041
	(0.000054)	(0.000054)	(0.000054)
Apps by platform provider in subcategory	-0.00043***	-0.00042***	-0.00043***
	(0.00014)	(0.00014)	(0.00014)
Subcategory market size (ln)	0.00016	0.00016	0.00016
	(0.00017)	(0.00017)	(0.00017)
Complementor scope	-0.0029***	-0.0030***	-0.0030***
	(0.00022)	(0.00022)	(0.00022)
Apps by complementor in subcategory	0.0030***	0.0030***	0.0030***
	(0.00047)	(0.00047)	(0.00048)
Complementor performance	-0.00011	-0.00011	-0.00011
	(0.00012)	(0.00012)	(0.00012)
Complementor fixed effects	Yes	Yes	Yes
Subcategory fixed effects	Yes	Yes	Yes
Month fixed effects	Yes	Yes	Yes
Number of complementors	1,415	1,415	1,415
Number of observations	761,376	761,376	761,376
R^2	0.0060	0.0062	0.0060

Notes. Coefficients are reported with robust standard errors, clustered at the level of the complementor, in parentheses. The constant is estimated but not reported. Coefficients are from ordinary least squares regressions estimating the log-transformed number of app introductions.
* $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$.

Table B8. Cloglog Estimates of the Effect of PVC on App Withdrawals

Variable	1	2	3
PVC in subcategory	-0.602**	-1.422***	-0.321
	(0.249)	(0.541)	(0.287)
Platform ecosystem experience (ln)	-0.106	-0.126	-0.100
	(0.899)	(0.101)	(0.100)
PVC in subcategory x platform ecosystem experience (ln)		0.229*	
		(0.129)	
Exclusive platform focus	-0.201	-0.203	-0.104
	(0.183)	(0.184)	(0.187)
PVC in subcategory x exclusive platform focus			-0.960*
			(0.569)
App introductions in subcategory	-0.0014	-0.0028	-0.0040
	(0.023)	(0.024)	(0.023)
App withdrawals in subcategory	0.124**	0.125**	0.128**
	(0.060)	(0.060)	(0.060)
Apps by platform provider in subcategory	-0.197**	-0.195**	-0.199**
	(0.077)	(0.076)	(0.077)
Subcategory market size (ln)	0.0032	0.0043	0.0067
	(0.095)	(0.095)	(0.095)
Complementor scope	-0.010	-0.015	-0.012
	(0.075)	(0.076)	(0.075)
Apps by complementor in subcategory	0.305***	0.300***	0.300***
	(0.057)	(0.057)	(0.057)
App performance	-0.173	-0.172	-0.171
	(0.301)	(0.300)	(0.301)
App age	-0.0060	-0.0061	-0.0061
	(0.0050)	(0.0050)	(0.0050)
Number of ratings (ln)	0.045	0.045	0.046
	(0.118)	(0.119)	(0.118)
Rating valence	-0.145***	-0.145***	-0.145***
	(0.054)	(0.054)	(0.054)
Month fixed effects	Yes	Yes	Yes
Number of apps	2,158	2,158	2,158
Number of observations	21,893	21,893	21,893
Log-likelihood	-886.179	-885.263	-884.734

Notes. Coefficients are reported with robust standard errors, clustered at the level of the app, in parentheses. The constant is estimated but not reported. Coefficients are from complementary log-log transformation (i.e., cloglog) discrete-time proportional hazard models estimating the likelihood of app withdrawal. As cloglog models require within-variance for estimation, app and subcategory fixed effects are omitted because observations on apps and subcategories without app withdrawals would otherwise be dropped.
* $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$.

Table B9. Alternative Moderator Specifications in the App Introduction Analyses

Variable	1	2	3
PVC in subcategory	0.00037**	0.0029***	0.00043**
	(0.00018)	(0.00055)	(0.00019)
Platform ecosystem experience (ln)	-0.00060***	-0.00050***	-0.00061***
	(0.00013)	(0.00013)	(0.00013)
PVC in subcategory x platform ecosystem experience (ln)		-0.0010***	
		(0.00016)	
PVC in subcategory x multihoming			-0.00072*
			(0.00041)
App introductions in subcategory	-0.000084***	-0.000086***	-0.000084***
	(0.000028)	(0.000028)	(0.000028)
App withdrawals in subcategory	0.000094	0.000094	0.000094
	(0.000071)	(0.000071)	(0.000071)
Apps by platform provider in subcategory	-0.00049***	-0.00048***	-0.00049***
	(0.00017)	(0.00017)	(0.00017)
Subcategory market size (ln)	0.00021	0.00022	0.00021
	(0.00021)	(0.00021)	(0.00021)
Complementor scope	-0.0046***	-0.0046***	-0.0046***
	(0.00022)	(0.00021)	(0.00021)
Apps by complementor in subcategory	0.0036***	0.0036***	0.0036***
	(0.00057)	(0.00057)	(0.00057)
Complementor performance	-0.00020	-0.00020	-0.00020
	(0.00013)	(0.00013)	(0.00013)
Complementor fixed effects	Yes	Yes	Yes
Category fixed effects	Yes	Yes	Yes
Month fixed effects	Yes	Yes	Yes
Number of complementors	1,415	1,415	1,415
Number of observations	761,376	761,376	761,376
R^2	0.0058	0.0060	0.0058

Notes. Coefficients are reported with robust standard errors, clustered at the level of the complementor, in parentheses. The constant is estimated but not reported. Coefficients are from linear probability models estimating the likelihood of app introduction. Platform ecosystem experience is measured as the log-transformed number of months since the oldest app by a complementor was released. Multihoming is a dummy variable that takes a positive value if a complementor has apps in competing platform ecosystems and is reflective of a lack of an exclusive platform focus.

* $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$.

Table B10. Alternative Moderator Specifications in the App Withdrawal Analyses

Variable	1	2	3
PVC in subcategory	-0.0032**	-0.014**	-0.0043***
	(0.0016)	(0.0061)	(0.0016)
Platform ecosystem experience (ln)	-0.0061**	-0.0049*	-0.0060**
	(0.0028)	(0.0029)	(0.0028)
PVC in subcategory x platform ecosystem experience (ln)		0.0032*	
		(0.0018)	
PVC in subcategory x multihoming			0.014*
			(0.0080)
App introductions in subcategory	-0.000057	-0.000028	-0.000043
	(0.00016)	(0.00016)	(0.00016)
App withdrawals in subcategory	0.00074	0.00070	0.00074
	(0.00049)	(0.00049)	(0.00049)
Apps by platform provider in subcategory	-0.0037**	-0.0038**	-0.0038**
	(0.0015)	(0.0015)	(0.0015)
Subcategory market size (ln)	0.00065	0.0011	0.0012
	(0.0040)	(0.0041)	(0.0040)
Complementor scope	-0.0045**	-0.0044**	-0.0044**
	(0.0022)	(0.0022)	(0.0022)
Apps by complementor in subcategory	0.014**	0.014**	0.014**
	(0.0057)	(0.0057)	(0.0057)
App performance	0.0000095	0.000098	0.000059
	(0.0023)	(0.0024)	(0.0024)
App age	0.0020	0.0022	0.0020
	(0.0024)	(0.0024)	(0.0024)
Number of ratings (ln)	-0.0073***	-0.0075***	-0.0074***
	(0.0015)	(0.0015)	(0.0015)
Rating valence	0.00034	0.00029	0.00035
	(0.00071)	(0.00071)	(0.00071)
App fixed effects	Yes	Yes	Yes
Month fixed effects	Yes	Yes	Yes
Number of apps	2,158	2,158	2,158
Number of observations	21,893	21,893	21,893
R^2	0.011	0.011	0.011

Notes. Coefficients are reported with robust standard errors, clustered at the level of the app, in parentheses. The constant is estimated but not reported. Coefficients are from linear probability models estimating the likelihood of app withdrawal. Platform ecosystem experience is measured as the log-transformed number of months since the oldest app by a complementor was released. Multihoming is a dummy variable that takes a positive value if a complementor has apps in competing platform ecosystems and is reflective of a lack of an exclusive platform focus

* $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$.

Table B11. Subsample Analyses Estimating the Effect of PVC on App Introductions for Incumbent Complementors

Variable	1	2	3
PVC in subcategory	0.00028*	0.0035***	0.000018
	(0.00017)	(0.0013)	(0.00016)
Platform ecosystem experience (ln)	-0.00078***	-0.00077***	-0.00079***
	(0.00023)	(0.00023)	(0.00023)
PVC in subcategory x platform ecosystem experience (ln)		-0.00092***	
		(0.00034)	
PVC in subcategory x exclusive platform focus			0.00080**
			(0.00033)
App introductions in subcategory	-0.000055**	-0.000057**	-0.000055**
	(0.000026)	(0.000025)	(0.000026)
App withdrawals in subcategory	0.000051	0.000052	0.000051
	(0.000060)	(0.000060)	(0.000060)
Apps by platform provider in subcategory	-0.00030**	-0.00030*	-0.00030**
	(0.00015)	(0.00015)	(0.00015)
Subcategory market size (ln)	0.00023	0.00025	0.00024
	(0.00017)	(0.00017)	(0.00017)
Complementor scope	-0.0047***	-0.0047***	-0.0047***
	(0.00036)	(0.00036)	(0.00036)
Apps by complementor in subcategory	0.0038***	0.0038***	0.0038***
	(0.00059)	(0.00059)	(0.00059)
Complementor performance	-0.000063	0.000061	-0.000059
	(0.00014)	(0.00014)	(0.00014)
Complementor fixed effects	Yes	Yes	Yes
Category fixed effects	Yes	Yes	Yes
Month fixed effects	Yes	Yes	Yes
Number of complementors	1,072	1,072	1,072
Number of observations	575,190	575,190	575,190
R^2	0.0080	0.0081	0.0080

Notes. Coefficients are reported with robust standard errors, clustered at the level of the complementor, in parentheses. The constant is estimated but not reported. Coefficients are from linear probability models estimating the likelihood of app introduction.

* $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$.

Table B12. Subsample Analyses Estimating the Effect of PVC on App Withdrawal for Incumbent Complementors

Variable	1	2	3
PVC in subcategory	-0.0029*	-0.014**	-0.000011
	(0.0017)	(0.0058)	(0.0025)
Platform ecosystem experience (ln)	-0.0043*	-0.0051*	-0.0043*
	(0.0024)	(0.0025)	(0.0032)
PVC in subcategory x platform ecosystem experience (ln)		0.0030**	
		(0.0014)	
PVC in subcategory x exclusive platform focus			0.0064**
			(0.0032)
App introductions in subcategory	-0.000047	-0.000023	-0.000037
	(0.00018)	(0.00017)	(0.00018)
App withdrawals in subcategory	0.00056	0.00053	0.00061
	(0.00051)	(0.00051)	(0.00051)
Apps by platform provider in subcategory	-0.0039**	-0.0040**	-0.0041**
	(0.0015)	(0.0016)	(0.0016)
Subcategory market size (ln)	0.00015	0.00046	0.00037
	(0.0042)	(0.0042)	(0.0042)
Complementor scope	-0.0030	-0.0028	-0.0029
	(0.0020)	(0.0020)	(0.0020)
Apps by complementor in subcategory	0.018***	0.018***	0.018***
	(0.0069)	(0.0069)	(0.0069)
App performance	0.0017	0.0018	0.0017
	(0.0026)	(0.0026)	(0.0026)
App age	0.0047*	0.0048*	0.0048*
	(0.0029)	(0.0028)	(0.0029)
Number of ratings (ln)	-0.0056***	-0.0056***	-0.0057***
	(0.0015)	(0.0015)	(0.0015)
Rating valence	0.00036	0.00037	0.00037
	(0.00036)	(0.00037)	(0.00036)
App fixed effects	Yes	Yes	Yes
Month fixed effects	Yes	Yes	Yes
Number of apps	1,792	1,792	1,792
Number of observations	19,951	19,951	19,951
R^2	0.011	0.012	0.011

Notes. Coefficients are reported with robust standard errors, clustered at the level of the app, in parentheses. The constant is estimated but not reported. Coefficients are from linear probability models estimating the likelihood of app withdrawal.

* $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$.