Empirical Supplement for "Estimation and inference in discrete games with uncertain behavior"

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Abstract

This document includes supplemental results for the Monte Carlo experiments in Section 5, and the empirical illustration in Section 6 of the paper for additional choices of the tuning parameters. Every section, table and figure in this document has the format **EX.X**. Any section, table or figure that we reference here which does not have this format refers to the main paper.

E1 Results for our empirical illustration for some alternative bandwidth choices

The results presented in Section 6 for our empirical illustration correspond to a bandwidth choice of the form $h_n = c_h \cdot \widehat{\sigma}(Z) \cdot n^{-1/5}$ for $c_h = 1$, where Z represents market size ($Z = \log(Population)$). Here we present results for $c_h = 0.80$, $c_h = 1$ and $c_h = 1.40$. Given our sample size ($n = 954$), these bandwidths are $h_n \approx 0.20 \cdot \widehat{\sigma}(Z)$ (for $c_h = 0.80$), $h_n \approx 0.25 \cdot \widehat{\sigma}(Z)$ (for $c_h = 1.0$), and $h_n \approx 0.35 \cdot \widehat{\sigma}(Z)$ (for $c_h = 1.40$). These are also the values of c_h that we consider in our Monte Carlo experiments. Note that, since the MLE estimators for the non-strategic parameters are unaffected by our bandwidth choice, we only need to focus on the conditional-GMM estimates of the strategic interaction parameters $(\Delta_{10}, \Delta_{20})$ and the estimated probability of cooperation, $\widehat{\pi}(z, \widehat{\theta})$. As in Section 6, let $\widehat{f_Z}(z)$ denote the kernel-estimator for $f_Z(z)$ and let $\widehat{f}_{Z,\alpha}$ denote the α^{th} sample quantile of $(\widehat{f_Z}(Z_i))_{i=1}^n$. Let $\widehat{\tau}_{Z,\alpha}$ denote the α^{th} sample quantile of $(Z_i)_{i=1}^n$. The inference range $\mathcal{Z}$ used for our conditional-GMM estimator for $(\Delta_{10}, \Delta_{20})$ was $\mathcal{Z} = \left\{z \in \mathbb{R} : \widehat{\tau}_{Z,0.001} \le z \le \widehat{\tau}_{Z,0.999}\ ,\ \widehat{f_Z}(z) \ge \widehat{f}_{Z,0.001}\right\}$.

E1.1 Strategic interaction effects

Table E1 presents our estimates for the strategic interaction effects $(\Delta_{10}, \Delta_{20})$ for the bandwidth choices described above, and Table E2 presents the results of the test of asymmetric interaction effects, $H_0 : \Delta_{20} \ge \Delta_{10}$ against $H_1 : \Delta_{20} < \Delta_{10}$. As we can see, even though the numerical values of the strategic-interaction estimates change (as we would expect), the following main findings remained qualitatively unchanged,

1.– Both strategic effects are statistically significant, with $\Delta_{20} < \Delta_{10}$.

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2.– The null hypothesis $H_{20} \geq \Delta_{10}$ was rejected in favor of $H_1 : \Delta_{20} < \Delta_{10}$ with p-values close to zero in all cases.

The finding that the strategic effect is significant for both players, but stronger for Lowe's than Home Depot was robust to our bandwidth choices.

E1.2 Probability of cooperation

As we illustrated in Figure 3, the results of our empirical illustration for the bandwidth choice $c_h = 1$ suggested an underlying probability of cooperation that is *decreasing* in market size. Figure E1 plots $\widehat{\pi}(z, \widehat{\theta})$ against z for our three bandwidth choices, and it shows that this finding is robust across all bandwidth choices considered. Outcomes consistent with noncooperative behavior are more likely to be observed in large markets, while outcomes consistent with cooperation are more likely to be observed in small markets.

Table E1: Estimation results for strategic interaction parameters (standard errors in parenthesis)

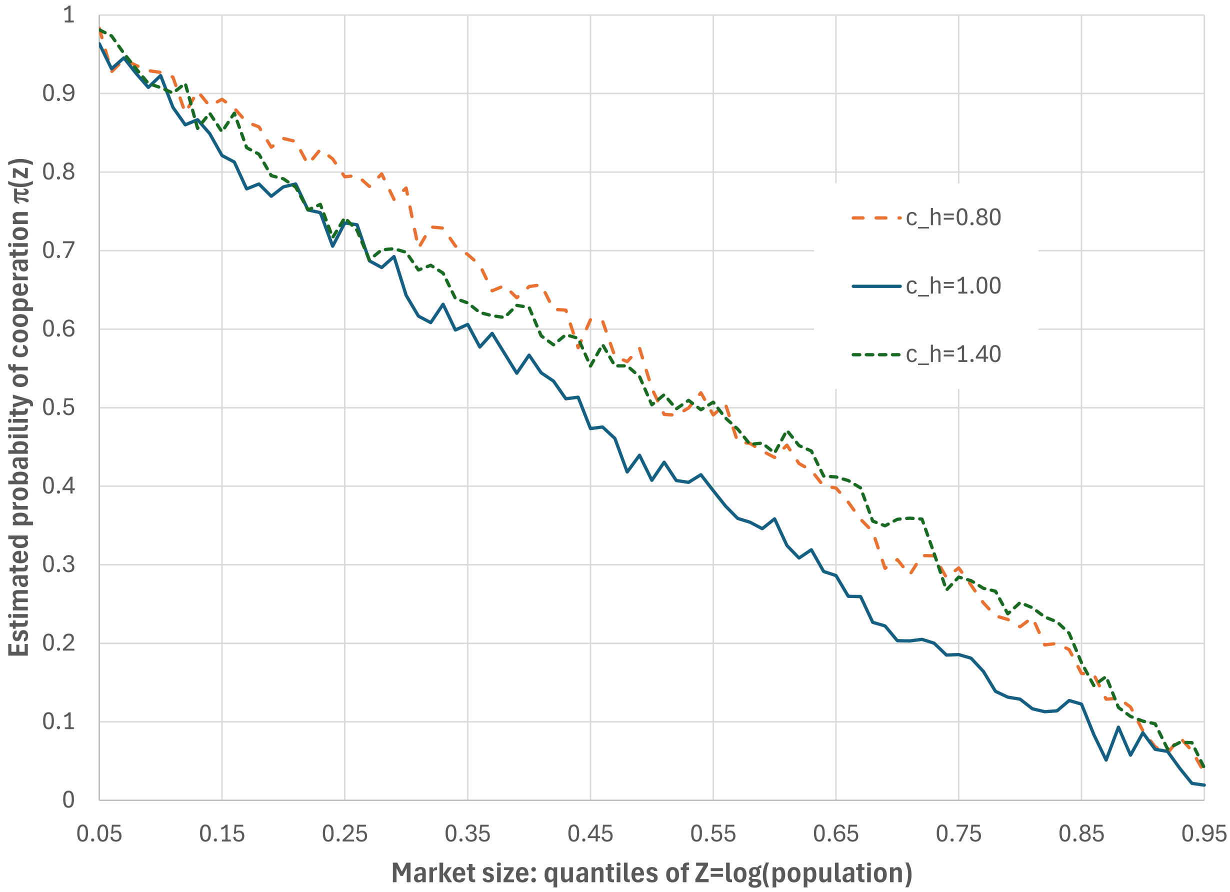
	Player 1 (Lowe's): Δ_{10}	Player 2 (Home Depot): Δ_{20}
$c_h = 0.80$	1.021*	0.367*
	(0.051)	(0.055)
$c_h = 1.0$	0.946*	0.257*
	(0.143)	(0.022)
$c_h = 1.40$	0.588*	0.205*
	(0.021)	(0.029)

(∗) denotes statistically significant at a 1% significance level.
Gaussian kernel.

Table E2: Results of the test $H_0 : \Delta_{20} \geq \Delta_{10}$ against $H_1 : \Delta_{20} < \Delta_{10}$

	$c_h = 0.80$	$c_h = 1.0$	$c_h = 1.40$
test-statistic	-6.568	-5.329	-7.607
(p-value)	(0.000)	(0.000)	(0.000)

Figure E1: Estimated probability of cooperation, $\widehat{\pi}(z, \widehat{\theta})$ and market size. Results for different bandwidth choices



- Values of market size shown range from the 5th to the 95th quantiles of $Z = \log(Population)$.
- Bandwidths constructed as $h_n = c_h \cdot \widehat{\sigma}(Z) \cdot n^{-1/5}$.

E2 Monte Carlo experiment results for alternative bandwidth choices

As we described in our Monte Carlo experiments in Section 5, our bandwidth was of the form $h_n = c_h \cdot \widehat{\sigma}(Z) \cdot n^{-1/5}$. Section 5 presents results for $c_h = 1$; here we evaluate the robustness of our findings to bandwidth selection and we present results also for $c_h = 0.80$ and $c_h = 1.40$. Our estimation of the non-strategic parameters $\gamma \equiv (\beta_1^c, \beta_1^w, \beta_1^z, \beta_2^c, \beta_2^w, \beta_2^z, \rho)$ is unaffected by the bandwidth choice, so we focus on the estimation results for our strategic-interaction parameters (Δ_1, Δ_2) and the estimation of $\widehat{\pi}(z, \widehat{\theta})$ (the probability of cooperation conditional on $Z = z$). We will present the results for our three bandwidth choices: $c_h = 0.80$, $c_h = 1$ and $c_h = 1.40$.

E2.1 Estimation and inference results for strategic-interaction parameters for alternative bandwidth choices

In this section we present and compare the estimation results for the strategic-interaction parameters (Δ_1, Δ_2) as well as the hypothesis tests for asymmetric effects, $H_0^a : \Delta_{20} \geq \Delta_{10}$ against $H_1^a : \Delta_{20} < \Delta_{10}$, and $H_0^b : \Delta_{20} \leq \Delta_{10}$ against $H_1^b : \Delta_{20} > \Delta_{10}$ for the three bandwidth choices described above.

E2.1.1 Estimation results for (Δ_1, Δ_2)

Table E3 summarizes the results for our estimated strategic-interaction effects for our three bandwidth choices. The table shows that the results are qualitatively very similar, particularly when $n = 2,000$. While the median bias seems to be slightly smallest for $c_h = 1$ and largest for $c_h = 1.40$ across all sample sizes, but the difference is relatively minor, driving us to conclude that the results for our experiments are robust to the bandwidth choices analyzed.

E2.1.2 Results for the tests $H_0^a : \Delta_{20} \geq \Delta_{10}$ against $H_1^a : \Delta_{20} < \Delta_{10}$, and $H_0^b : \Delta_{20} \leq \Delta_{10}$ against $H_1^b : \Delta_{20} > \Delta_{10}$

Table E4 describes the empirical rejection rates for both hypothesis for each bandwidth choice. In all cases, the test-statistic is as described in Section 5.1.1 of the paper, and the target significance level is 5%. Since $\Delta_{10} < \Delta_{20}$, the asymptotic probability of rejection of H_0^a should be zero, and the asymptotic probability of rejection of H_0^b should be 1. The results show that, for $n = 2,000$, the rejection frequency for all three bandwidth choices is close to 5%, our target significance level, and the rejection frequency of H_0^b is around 76% for all three. For smaller sample sizes, our three bandwidth choices tend to overreject H_0^a relative to the target significance level, with this frequency being smallest for $c_h = 0.80$ and largest for $c_h = 1.40$. Overall, it appears that $c_h = 1$ achieves a good balance between being size and power, with rejection frequencies of H_0^a that are reasonably close to 5% without paying too much of a price in terms of power for rejecting H_0^b. Once again, for $n = 2,000$ all three bandwidth choices yield similar results, all in line with the asymptotic predictions of Proposition 1.

E2.2 Estimation results for $\widehat{\pi}(Z,\widehat{\theta})$, the probability of cooperation, for alternative bandwidth choices

Here we repeat the estimation shown in Tables 4 and 3 in the paper, where we estimate the aggregate (unconditional) probability of cooperation, and the probability of cooperation conditional on $Z = z$ for $z \in \{-1, -0.675, -0.5, -0.25, 0, 0.25, 0.5, 0.675, 1\}$.

E2.2.1 Estimation results for $\widehat{\pi}(z,\widehat{\theta})$ for a collection of values of z

Tables E5-E7 summarize our results for $\widehat{\pi}(z,\widehat{\theta})$ for $z \in \{-1, -0.675, -0.5, -0.25, 0, 0.25, 0.5, 0.675, 1\}$ for the bandwidths produced by $c_h = 0.80$, $c_h = 1.0$ and $c_h = 1.40$, respectively. In all cases we restrict attention to estimates inside $(0,1)$. Our main findings can be summarized as follows.

- For every bandwidth choice and every sample size, our results show that the probability of cooperation is *decreasing* in Z.
- Bias properties varied slightly across bandwidths depending on the value of z analyzed, but there was no evidence that one bandwidth choice uniformly dominated another for all z and every sample size. In particular, median bias was very similar across bandwidth choices for each z for $n = 2,000$.
- Even though our estimators $\widehat{\pi}(z,\widehat{\theta})$ converge at a nonparametric rate, they had good coverage probability. In particular, the true value of $\pi(z)$ was included in the simulation interquartile range of $\widehat{\pi}(z,\widehat{\theta})$ for every sample size for $z \in \{-1, -0.675, -0.50, 0, 0.25\}$. This was also true for $z = 0.50$ and $c_h = 1.40$ (our largest bandwidth). Convergence appears to be slower for $z = 1$, which corresponds to $\pi(z) = 0.054$ (the smallest cooperation probability across the values analyzed). Undersmoothing (choosing $c_h = 0.80$) yielded a slightly larger bias for $\pi(z)$ when $z = 1$ relative to $c_h = 1$ and $c_h = 1.40$ (the choice of $c_h = 1$ had the smallest bias in this case), but the difference in bias was relatively minor.

E2.2.2 Estimation results for $\widehat{\pi}$, the aggregate probability of cooperation.

Table E8 summarizes our results for the estimation of π, the aggregate probability of cooperation for each of the three bandwidth choices described here. As in Section 5.2 of the paper, the estimator $\widehat{\pi}$ is constructed as $\widehat{\pi} = \frac{1}{n}\sum_{i=1}^{n} \widehat{\pi}(Z_i,\widehat{\theta})$. Comparing the results across each bandwidth choice do not provide clear evidence of one bandwidth choice dominating the others across all sample sizes, with the results being fairly similar when $n = 2,000$, although with slightly better coverage for $c_h = 1$ and $c_h = 1.40$ (similarly to our findings regarding $\widehat{\pi}(z,\widehat{\theta})$, above). The findings described above, in Section E2.1, suggested that choosing $c_h = 1$ produced slightly better results across the three bandwidths considered. The results in Tables E5-E8 do not contradict this.

Table E3: Monte Carlo estimation results for (Δ_1, Δ_2) for $c_h \in \{0.80, 1.0, 1.40\}$

Parameter	**True value**	**Element-wise quantiles of $(\widehat{\Delta_1}, \widehat{\Delta_2})$ across our simulations**					
		0.15^{th} quantile	**0.25^{th} quantile**	**median**	**0.75^{th} quantile**	**0.85^{th} quantile**	**median bias**
$n = 500$							
Results for $c_h = 0.80$							
Δ_1	0.5	0.225	0.341	0.614	0.929	1.079	0.287
Δ_2	1	0.428	0.673	1.048	1.342	1.491	0.337
Results for $c_h = 1.0$							
Δ_1	0.5	0.218	0.337	0.621	0.922	1.073	0.283
Δ_2	1	0.437	0.682	1.048	1.345	1.499	0.334
Results for $c_h = 1.40$							
Δ_1	0.5	0.218	0.327	0.610	0.928	1.079	0.290
Δ_2	1	0.421	0.682	1.045	1.361	1.515	0.343
$n = 1,000$							
Results for $c_h = 0.80$							
Δ_1	0.5	0.220	0.328	0.552	0.789	0.911	0.231
Δ_2	1	0.592	0.775	1.039	1.254	1.375	0.237
Results for $c_h = 1.0$							
Δ_1	0.5	0.213	0.333	0.556	0.801	0.934	0.231
Δ_2	1	0.611	0.795	1.049	1.271	1.388	0.245
Results for $c_h = 1.40$							
Δ_1	0.5	0.226	0.340	0.557	0.802	0.934	0.233
Δ_2	1	0.528	0.741	1.038	1.267	1.409	0.263
$n = 2,000$							
Results for $c_h = 0.80$							
Δ_1	0.5	0.256	0.345	0.550	0.748	0.850	0.202
Δ_2	1	0.790	0.884	1.061	1.205	1.288	0.169
Results for $c_h = 1.0$							
Δ_1	0.5	0.257	0.347	0.557	0.745	0.850	0.198
Δ_2	1	0.771	0.888	1.059	1.208	1.291	0.172
Results for $c_h = 1.40$							
Δ_1	0.5	0.244	0.343	0.545	0.746	0.851	0.203
Δ_2	1	0.762	0.882	1.068	1.217	1.301	0.181

• 2,000 simulations in each case, Gaussian kernel

Table E4: Monte Carlo results for strategic-effect hypotheses tests for $c_h \in \{0.80, 1.0, 1.40\}$

Monte Carlo rejection frequencies of null hypothesis		
	$H_0^a: \Delta_{20} \geq \Delta_{10}$ **vs.** $H_1^a: \Delta_{20} < \Delta_{10}$	$H_0^b: \Delta_{10} \geq \Delta_{20}$ **vs.** $H_1^b: \Delta_{10} < \Delta_{20}$
	Results for $c_h = 0.80$	
$n = 500$	0.063	0.288
$n = 1000$	0.059	0.552
$n = 2000$	0.043	0.757
	Results for $c_h = 1.0$	
$n = 500$	0.074	0.347
$n = 1,000$	0.063	0.580
$n = 2,000$	0.045	0.760
	Results for $c_h = 1.40$	
$n = 500$	0.083	0.376
$n = 1000$	0.085	0.574
$n = 2000$	0.053	0.763

- True parameters values: $\Delta_{10} = 0.5$ and $\Delta_{20} = 1$
- 1,000 simulations, Gaussian kernel
- Target significance level 5%

Table E5: **Monte Carlo results for $\widehat{\pi}(z)$ for various values of z. Results for $c_h = 0.80$**

$n = 500$							
	True value of $\pi(z)$	**Summary of results for $\widehat{\pi}(z)$**					
		0.15^{th} quantile	**0.25^{th} quantile**	**median**	**0.75^{th} quantile**	**0.85^{th} quantile**	**median bias**
$z = -1$	0.652	0.186	0.298	0.543	0.752	0.847	0.225
$z = -0.675$	0.526	0.163	0.249	0.476	0.692	0.794	0.231
$z = -0.50$	0.457	0.155	0.233	0.442	0.657	0.769	0.213
$z = -0.25$	0.360	0.129	0.219	0.390	0.613	0.724	0.186
$z = 0$	0.271	0.100	0.173	0.340	0.568	0.676	0.183
$z = 0.25$	0.195	0.098	0.148	0.322	0.539	0.671	0.166
$z = 0.50$	0.134	0.080	0.138	0.295	0.515	0.657	0.162
$z = 0.675$	0.100	0.081	0.138	0.304	0.525	0.672	0.205
$z = 1$	0.054	0.074	0.136	0.287	0.538	0.675	0.233
$n = 1,000$							
	True value of $\pi(z)$	**Summary of results for $\widehat{\pi}(z)$**					
		0.15^{th} quantile	**0.25^{th} quantile**	**median**	**0.75^{th} quantile**	**0.85^{th} quantile**	**median bias**
$z = -1$	0.652	0.236	0.346	0.549	0.758	0.842	0.203
$z = -0.675$	0.526	0.180	0.275	0.464	0.676	0.790	0.206
$z = -0.50$	0.457	0.161	0.244	0.428	0.633	0.753	0.199
$z = -0.25$	0.360	0.137	0.204	0.376	0.583	0.692	0.178
$z = 0$	0.271	0.107	0.163	0.323	0.516	0.647	0.168
$z = 0.25$	0.195	0.079	0.135	0.272	0.493	0.622	0.144
$z = 0.50$	0.134	0.070	0.122	0.252	0.471	0.605	0.126
$z = 0.675$	0.100	0.065	0.116	0.253	0.466	0.607	0.153
$z = 1$	0.054	0.062	0.105	0.258	0.441	0.594	0.205
$n = 2,000$							
	True value of $\pi(z)$	**Summary of results for $\widehat{\pi}(z)$**					
		0.15^{th} quantile	**0.25^{th} quantile**	**median**	**0.75^{th} quantile**	**0.85^{th} quantile**	**median bias**
$z = -1$	0.652	0.220	0.337	0.556	0.750	0.842	0.204
$z = -0.675$	0.526	0.206	0.301	0.486	0.683	0.773	0.195
$z = -0.50$	0.457	0.178	0.256	0.432	0.627	0.727	0.186
$z = -0.25$	0.360	0.125	0.198	0.370	0.558	0.655	0.178
$z = 0$	0.271	0.096	0.156	0.314	0.502	0.613	0.161
$z = 0.25$	0.195	0.080	0.134	0.274	0.457	0.563	0.141
$z = 0.50$	0.134	0.061	0.110	0.240	0.421	0.527	0.121
$z = 0.675$	0.100	0.062	0.103	0.223	0.400	0.519	0.124
$z = 1$	0.054	0.058	0.098	0.219	0.399	0.514	0.165

2,000 simulations, $c_h = 0.80$, Gaussian kernel

Table E6: **Monte Carlo results for $\widehat{\pi}(z)$ for various values of z. Results for $c_h = 1.0$**

$n = 500$							
	True value of $\pi(z)$	**Summary of results for $\widehat{\pi}(z)$**					
		0.15^{th} quantile	**0.25^{th} quantile**	**median**	**0.75^{th} quantile**	**0.85^{th} quantile**	**median bias**
$z = -1$	0.652	0.167	0.295	0.526	0.740	0.842	0.225
$z = -0.675$	0.526	0.166	0.239	0.436	0.646	0.756	0.215
$z = -0.50$	0.457	0.150	0.233	0.422	0.625	0.739	0.199
$z = -0.25$	0.360	0.135	0.208	0.379	0.589	0.719	0.180
$z = 0$	0.271	0.094	0.164	0.339	0.528	0.653	0.176
$z = 0.25$	0.195	0.098	0.148	0.298	0.520	0.652	0.148
$z = 0.50$	0.134	0.085	0.142	0.286	0.502	0.658	0.152
$z = 0.675$	0.100	0.081	0.137	0.291	0.510	0.656	0.192
$z = 1$	0.054	0.081	0.123	0.290	0.504	0.633	0.236
$n = 1,000$							
	True value of $\pi(z)$	**Summary of results for $\widehat{\pi}(z)$**					
		0.15^{th} quantile	**0.25^{th} quantile**	**median**	**0.75^{th} quantile**	**0.85^{th} quantile**	**median bias**
$z = -1$	0.652	0.243	0.342	0.547	0.744	0.825	0.199
$z = -0.675$	0.526	0.190	0.273	0.462	0.663	0.770	0.201
$z = -0.50$	0.457	0.161	0.243	0.408	0.609	0.730	0.188
$z = -0.25$	0.360	0.125	0.192	0.359	0.539	0.668	0.173
$z = 0$	0.271	0.104	0.162	0.308	0.509	0.633	0.157
$z = 0.25$	0.195	0.083	0.133	0.278	0.474	0.621	0.141
$z = 0.50$	0.134	0.081	0.128	0.264	0.462	0.598	0.131
$z = 0.675$	0.100	0.068	0.123	0.254	0.447	0.583	0.155
$z = 1$	0.054	0.067	0.108	0.248	0.445	0.569	0.195
$n = 2,000$							
	True value of $\pi(z)$	**Summary of results for $\widehat{\pi}(z)$**					
		0.15^{th} quantile	**0.25^{th} quantile**	**median**	**0.75^{th} quantile**	**0.85^{th} quantile**	**median bias**
$z = -1$	0.652	0.215	0.338	0.565	0.744	0.833	0.193
$z = -0.675$	0.526	0.193	0.291	0.467	0.664	0.765	0.191
$z = -0.50$	0.457	0.169	0.250	0.420	0.620	0.731	0.188
$z = -0.25$	0.360	0.128	0.195	0.357	0.547	0.667	0.176
$z = 0$	0.271	0.098	0.155	0.313	0.498	0.608	0.161
$z = 0.25$	0.195	0.076	0.131	0.272	0.457	0.567	0.143
$z = 0.50$	0.134	0.064	0.109	0.237	0.421	0.519	0.123
$z = 0.675$	0.100	0.058	0.104	0.225	0.394	0.507	0.125
$z = 1$	0.054	0.056	0.086	0.210	0.405	0.515	0.156

2,000 simulations, $c_h = 1.0$, Gaussian kernel

Table E7: **Monte Carlo results for $\widehat{\pi}(z)$ for various values of z.** **Results for $c_h = 1.40$**

$n = 500$							
	True value of $\pi(z)$	**Summary of results for $\widehat{\pi}(z)$**					
		0.15^{th} quantile	**0.25^{th} quantile**	**median**	**0.75^{th} quantile**	**0.85^{th} quantile**	**median bias**
$z = -1$	0.652	0.158	0.264	0.478	0.687	0.790	0.231
$z = -0.675$	0.526	0.136	0.218	0.417	0.618	0.737	0.222
$z = -0.50$	0.457	0.130	0.205	0.390	0.594	0.721	0.211
$z = -0.25$	0.360	0.116	0.179	0.343	0.534	0.669	0.178
$z = 0$	0.271	0.093	0.164	0.308	0.519	0.632	0.162
$z = 0.25$	0.195	0.090	0.144	0.271	0.498	0.644	0.140
$z = 0.50$	0.134	0.084	0.125	0.268	0.499	0.612	0.168
$z = 0.675$	0.100	0.066	0.115	0.268	0.499	0.612	0.168
$z = 1$	0.054	0.072	0.134	0.286	0.517	0.647	0.233
$n = 1,000$							
	True value of $\pi(z)$	**Summary of results for $\widehat{\pi}(z)$**					
		0.15^{th} quantile	**0.25^{th} quantile**	**median**	**0.75^{th} quantile**	**0.85^{th} quantile**	**median bias**
$z = -1$	0.652	0.213	0.325	0.509	0.693	0.784	0.202
$z = -0.675$	0.526	0.172	0.262	0.425	0.621	0.734	0.202
$z = -0.50$	0.457	0.145	0.230	0.378	0.589	0.711	0.196
$z = -0.25$	0.360	0.133	0.196	0.330	0.548	0.664	0.170
$z = 0$	0.271	0.094	0.146	0.288	0.489	0.624	0.160
$z = 0.25$	0.195	0.072	0.123	0.260	0.476	0.617	0.142
$z = 0.50$	0.134	0.074	0.116	0.258	0.465	0.626	0.128
$z = 0.675$	0.100	0.068	0.114	0.247	0.474	0.622	0.147
$z = 1$	0.054	0.064	0.114	0.243	0.460	0.609	0.189
$n = 2,000$							
	True value of $\pi(z)$	**Summary of results for $\widehat{\pi}(z)$**					
		0.15^{th} quantile	**0.25^{th} quantile**	**median**	**0.75^{th} quantile**	**0.85^{th} quantile**	**median bias**
$z = -1$	0.652	0.227	0.345	0.546	0.726	0.813	0.194
$z = -0.675$	0.526	0.191	0.282	0.450	0.634	0.750	0.188
$z = -0.50$	0.457	0.167	0.239	0.403	0.592	0.697	0.182
$z = -0.25$	0.360	0.130	0.189	0.341	0.534	0.637	0.172
$z = 0$	0.271	0.099	0.160	0.304	0.481	0.597	0.154
$z = 0.25$	0.195	0.080	0.132	0.258	0.446	0.559	0.137
$z = 0.50$	0.134	0.068	0.110	0.238	0.422	0.549	0.121
$z = 0.675$	0.100	0.062	0.102	0.225	0.415	0.530	0.125
$z = 1$	0.054	0.051	0.094	0.215	0.399	0.521	0.161

2,000 simulations, $c_h = 1.40$, Gaussian kernel

Table E8: Monte Carlo results for $\widehat{\pi}$ for $c_h \in \{0.80, 1.0, 1.40\}$. True value is $\pi = \frac{1}{3}$

Quantiles of $\widehat{\pi}$ across our simulations					
0.15^{th} quantile	**0.25^{th} quantile**	**median**	**0.75^{th} quantile**	**0.85^{th} quantile**	**median $\lvert\widehat{\pi} - \pi\rvert$**
$n = 500$					
Results for $c_h = 0.80$					
0.118	0.178	0.340	0.564	0.681	0.181
Results for $c_h = 1.0$					
0.112	0.176	0.330	0.540	0.654	0.178
Results for $c_h = 1.40$					
0.106	0.168	0.322	0.526	0.631	0.178
$n = 1,000$					
Results for $c_h = 0.80$					
0.125	0.182	0.335	0.523	0.647	0.167
Results for $c_h = 1.0$					
0.124	0.178	0.325	0.503	0.633	0.161
Results for $c_h = 1.40$					
0.103	0.155	0.299	0.491	0.623	0.172
$n = 2,000$					
Results for $c_h = 0.80$					
0.122	0.182	0.339	0.515	0.629	0.161
Results for $c_h = 1.0$					
0.114	0.176	0.330	0.506	0.619	0.165
Results for $c_h = 1.40$					
0.117	0.176	0.323	0.495	0.617	0.159

- 2,000 simulations, Gaussian kernel