Online Appendices for “Estimating Platform Market Power in Two-Sided Markets with an Application to Magazine Advertising” by Minjae Song

Online Appendix I: Monte Carlo Simulation

In this section I use Monte Carlo simulations to demonstrate differences between the two models of two-sided markets, focusing on equilibrium prices and market shares and the price elasticity. For both models the profit function for platform j is

$$\pi_{jt} = \left(p^A_{jt} - mc^A_{jt}\right) s^A_{jt} M_A + \left(p^B_{jt} - mc^B_{jt}\right) s^B_{jt} M_B$$

where, for each side, mc_{jt} denotes marginal cost in market t, s_{jt} its market share and M the market size. For each model I generate 100 independent markets, each with five platforms (firms). Given platform characteristics and costs, I compute prices and market shares using profit maximization conditions, assuming that platforms compete á la Bertrand.

In the two-sided single-homing model, the utility functions are

$$\begin{aligned} u^A_{ijt} &= \mu^A_{jt} - \lambda^A p^A_{jt} + \alpha^A s^B_{jt} + \xi^A_{jt} + \varepsilon^A_{ijt} \\ u^A_{ijt} &= \mu^B_{jt} - \lambda^B p^B_{jt} + \alpha^B s^A_{jt} + \xi^B_{jt} + \varepsilon^B_{ijt} \end{aligned}$$

where μ_{jt} is platform $j's$ mean quality, p_{jt} its price, ξ_{jt} firm-specific unobserved quality, and ε_{ijt} an idiosyncratic error term with the type I extreme value distribution. For $\left(\mu^A_{jt}, \xi^A_{jt}, mc^A_{jt}, \lambda^A\right)$ and $\left(\mu^B_{jt}, \xi^B_{jt}, mc^B_{jt}, \lambda^B\right)$, I assume

$$\begin{aligned} \mu_{jt} &\sim U(0,2) \\ \xi_{jt} &\sim 0.1 \times N(0,1) \\ mc_{jt} &\sim U(0,1) \\ \lambda^A &= \lambda^B = 2 \\ \alpha^A &= \alpha^B = 1 \end{aligned}$$

Notice that I assume that each set of group agents likes the presence of the other group agents on a platform. I sort $\left(\mu^A_{jt}, \mu^B_{jt}, mc^A_{jt}, mc^B_{jt}\right)$ such that platform 1 has the lowest and platform 5 has the highest mean quality and marginal cost for both groups. In searching for prices and market shares that maximize the profits, I use the marginal cost as a starting point.[1]

In the competitive bottleneck model I use the same values as $\left(\mu^A_{jt}, \xi^A_{jt}, mc^A_{jt}, \lambda^A, \alpha^A\right)$ for the single-homing side. The demand of multi-homing agents is given as

$$s^B_j = \left(1 - G\left(\frac{p^B_j}{\delta_j\left(s^A_j M_A\right)} | \theta\right)\right)$$

where $G\left(\alpha^B\right)$ is the cdf of the log normal distribution with $E\left(\log\left(\alpha^B\right)\right) = 1$ and $Var\left(\log\left(\alpha^B\right)\right) = 1$, and

$$\delta_{jt} = \mu^B_{jt} + \xi^B_{jt}.$$

Table A1 shows the equilibrium prices and market shares averaged across 100 markets. The market size is set to $M_A/M_B = 10$ for both models, so there are ten times more agents in group A as in group B. Notice first sharp differences in equilibrium outcomes between the two models. In the two-sided single homing model platforms charge lower prices to the smaller group, group B, and pass this cost to the larger

[1] Given these parameter values there exists unique market shares for given prices. See Section I.C.

group. This is obvious as platforms must compete harder to attract group B agents. In the competitive bottleneck model, on the other hand, platforms charge much lower prices to group A agents with some platforms even giving subsidies (negative prices). In this model group A agents are more valuable as group B agents are willing to join multiple platforms as long as net benefits are positive. Compared to the two-sided single homing model, platforms can make substantially higher profits out of multi-homing agents, so they are more aggressive in competing for group A agents. This is consistent with the common observation in the advertising market where media platforms make profits from multi-homing advertisers and grant favorable treatments to consumers (readers or viewers) in forms of below-cost fees or even gifts. Notice that despite high prices, all platforms attract more than 30 percent of group B agents.

In Table A2 I evaluate the accuracy of the price-elasticity approximation by equation (12) (reported in columns under *Direct*) by comparing it with the correctly calculated own-price elasticity using equation (11) (columns under *Total*). The table shows that this approximation is especially poor in the competitive bottleneck model with the magnitude of average differences ranging from 38 to 63 percent for group A and 33 to 49 percent for group B. According to the approximated price elasticity, no platform sets prices at the elastic part of the demand curve on the single-homing side while all of them actually do so. The approximated price elasticity also indicates that prices charged by platforms 4 and 5 on the multi-homing side are set at the non-elastic part. The approximation is relatively better in the two-sided single homing model with average differences no larger than 3 percent, but it becomes poorer as the magnitude of α^A and α^B goes larger. For example, when $\alpha^A = \alpha^B = 2$, average differences range from 9 to 14 percent for group A and 12 to 19 percent for group B. Lastly, even the correct price elasticity indicates that all platforms except platform 5 set prices at the inelastic part for group B in the single-homing model. If markets were not two-sided, this pricing could not be profit-maximizing.

Online Appendix II: Computational Details of Merger Simulations

The computational algorithm used in the simulation in Section IV consists of two parts. In an outer part it searches for new equilibrium prices in a hypothetical market structure and in an inner part it search for membership allocations that satisfy the demand equations given prices. I use a globally convergent Newton routine for the outer part search and adopt an algorithm in Fortran 90 provided by Press, et.al.(1996). For the inner part I use the fixed-point homotopy method, which is one kind of homotopy continuation methods and adopt a computational package called HOMPACK90 by Watson, et.al. (1997).

Given a system of $2 \times J$ demand equations $F(s;p) = 0$, the homotopy routine finds s that makes $F(s;p)$ zero for any p that the Newton routine tries. In the fixed-point homotopy method, in particular, a homotopy function is defined as

$$H(s,t) = (1-t)\left(s - s^0\right) + tF(s)$$

where $0 \leq t \leq 1$ and s^0 can be any values between 0 and 1. Thus, when $t = 0$, $H(s,0) = s - s^0 = 0$ and when $t = 1$, $H(s,1) = F(s) = 0$.

Because there can be multiple sets of s that satisfy $F(s;p) = 0$, I use many sets of s^0 every time the homotopy algorithm is called for and check if each set of s^0 leads to the same solution. For s^0 I randomly draw from observed market shares without replacement. In the case of multiple solutions I select the one that maximizes the sum of all magazines' profits. Because I do not know the maximum number of solutions, I start with a small number of s^0 and increase the number until the maximum number of solutions does not change. In practice, I start with 20 sets of s^0 and increase it up to 100 sets. The case of multiple solutions does arise: I have found as many as 14 solutions in merger simulations.

Online Appendix III: The Market Size Effect

One may think there is some arbitrariness in the criterion used to choose the market size for advertisers, but it is not unreasonable to assume that most publishers made profits over the sample period, which spans from 1992 to 2010. The market size for the advertising side that makes all but one publishers' net present value of variable profits non-negative ranges from 152 to 158. There is one publisher, GVG, for which the market size needs to be larger than 158 to make it break even over the sample period. However, GVG's low profitability implied by the empirical model is not surprising, given that it was acquired by WAZ in 2001.

Moreover, in order for all publishers to make money over the sample period, the distribution of advertisers' willingness to pay needs to be stretched far right such that the advertiser-side marginal cost is estimated to be negative for a substantial portion of magazines. For example, when the advertiser-side market size is assumed to be 159, the variance of the distribution for advertisers' willingness to pay is estimated to be 115.5, and about a quarter of magazine-quarter observations are estimated to have negative marginal costs on the advertiser side. When the advertiser-side market size is assumed to be 152 as in the main specification, this variance is estimated to be 33.76, and about 16% of magazine-quarter observations are estimated to have negative marginal costs on the advertiser side.

It appears that the patterns that characterize the merger simulation results, described in Section IV, are not sensitive to different values of the market size as long as all but one publishers' net present value of variable profits is non-negative. However, when the advertiser-side market size becomes smaller such that more than one publisher fail to break even over the sample period, the magnitude of post-merger price changes becomes substantially smaller.

Tables A3 and A4 show merger simulation results for the BMK and WAZ merger when the market size on the advertiser side is 149 and 155.[2] When the advertiser-side market size is assumed to be 149, the GMM estimate for the scale parameter of the distribution for advertisers' willingness to pay is 1.23 and statistically significant at a 5% level, which implies that the variance of this distribution is 16.43. When the advertiser-side market size is assumed to be 155, this scale parameter is estimated to be 1.45 and statistically significant, which implies that the variance of this distribution is 58.59.

Estimates for the other coefficients change little, compared to those in the main specification. On the advertiser side, the coefficient for advertisers' marginal utility for content pages is -0.043, as compared to -0.037 in the main specification, when the market size is set to 149 and -0.033 when the market size is set to 155. On the reader side, the coefficient for readers' marginal utility for advertising changes most, which goes down from 2.855 in the main specification to 2.799 when the market size is 149 and goes up to 2.912 when the market size is 155. These coefficients are all statistically significant at a 5% level.

Tables A3 and A4 show that merger simulation results are not substantially different from those in the main specification when the market size is set to 155. When the market size is set to 149, it is still the case that copy prices go up much more modestly than what the one-sided market model predicts and ad prices tend to move in the opposite direction to copy prices post merger. However, it is no longer the case that the copy prices of the two monthly magazines increase more than what the one-sided market model predicts post merger. Both copy prices and ad prices go up for these two monthly magazines post merger, but the magnitude of the price increase is much smaller. A reason for the modest price increases would be that advertisers' willingness to pay for advertising space is substantially smaller at this market size such that the merged publisher would have much weaker incentives to raise copy prices to make more money from advertisers advertising on other magazines.

Online Appendix IV: Merger Simulations for Two Special Cases

In this section I analyze merger effects for two special cases of the two-sided market model. The first case is the setting where readers are indifferent about advertising. In this case the first order condition for ad prices becomes

$$\frac{\partial \pi_{1+2}}{\partial p_1^B} = s_1^B M^B + (p_1^B - c_1^B)\frac{\partial s_1^B}{\partial p_1^B} M^B = 0$$

[2]When the market size is set to 149, three publishers are estimated to make a loss over the sample period. It would not be realistic to assume that three out of seven publishers did not make money over a 20-year period.

because changes in ad prices have no direct effect on magazines' reader-side market shares, i.e., $\frac{\partial s_k^A}{\partial p_j^B} = 0, \forall j, k$, and the cross elasticity of ad price is zero, i.e., $\frac{\partial s_k^B}{\partial p_j^B} = 0, j \neq k$. Recall that multi-homing advertisers' demand for advertising in one magazine is independent of their demand for advertising in another magazine unless the amount of advertising affects readers' magazine choices in one way or another.

The first order condition for copy prices has the same terms as equation (16), i.e.,

$$\begin{aligned}\frac{\partial \pi_{1+2}}{\partial p_1^A} &= s_1^A M^A + (p_1^A - c_1^A)\frac{\partial s_1^A}{\partial p_1^A} M^A + (p_2^A - c_2^A)\frac{\partial s_2^A}{\partial p_1^A} M^A \\ &+ (p_1^B - c_1^B)\frac{\partial s_1^B}{\partial p_1^A} M^B + (p_2^B - c_2^B)\frac{\partial s_2^B}{\partial p_1^A} M^B = 0\end{aligned}$$

However, the magnitude of the own and the cross elasticities of copy prices is different from those in equation (16) because the effects of a change in copy prices that spill over to the advertising side do not spill back to the reader side, i.e., no feedback loop effects.

It looks as if ad prices would not change post merger under the simplified first order condition (for ad prices) because they should be the same monopoly prices pre and post merger. However, ad prices still change post merger because the reader-side market shares change and advertisers' demand for advertising shifts in response to changes in the reader-side market shares.

It is likely that publishers increase ad prices more than in the case of readers liking advertising because fewer ads resulting from higher ad prices would not adversely affect readers' demand for magazines. The first-order effect of a merger on copy prices is also likely larger because the own and the cross elasticities of copy prices are smaller (in absolute terms) in the absence of the feedback loop effects. That is, readers are less price sensitive in the absence of the feedback loop effects.

Tables A5 and A6 summarize merger effects with no feedback loop effects in the case of the BMK and WAZ merger. The results under the *Baseline* heading are those of the main specification reported in Tables 5 and 6. As expected, price effects are larger when readers do not care about advertising. While sales-weighted average price changes for the whole TV magazine industry are 11.48% for copy prices and 3.17% for ad prices in the baseline model, they are 20.13% for copy prices and 5.88% for ad prices when readers do not care about advertising. The larger price changes result in larger output changes. In the baseline model magazine sales are predicted to decrease by 5.83% and the number of ad pages are predicted to decrease by 10.46% for the whole TV magazine industry. The industry-wide sales-weighted average changes are now 6.76% for magazine sales and 16.01% for the number of ad pages when readers do not care about advertising.

It is worth emphasizing that prices can still decrease post merger with no feedback loop effects because demand for advertising still increases when copy prices decrease, i.e., $\frac{\partial s_1^B}{\partial p_1^A}$ is negative. For all magazines for which the merged publisher is predicted to decrease copy prices in the baseline model, their copy prices go down when readers do not care about advertising. In fact, their copy prices are predicted to go down further than in the baseline model because of no feedback loop effects.

The second special case is the setting where publishers distribute magazines for free, i.e., zero copy price. The first order condition for ad prices is the same as equation (17) except that $p_j^A = 0$ for all j's:

$$\begin{aligned}\frac{\partial \pi_{1+2}}{\partial p_1^B} &= s_1^B M^B + (p_1^B - c_1^B)\frac{\partial s_1^B}{\partial p_1^B} M^B + (p_2^B - c_2^B)\frac{\partial s_2^B}{\partial p_1^B} M^B \\ &- c_1^A \frac{\partial s_1^A}{\partial p_1^B} M^A - c_2^A \frac{\partial s_2^A}{\partial p_1^B} M^A = 0\end{aligned}$$

In this case merger effects would be manifested only through higher ad prices as they are the only means that publishers can use to internalize the substitution effects. A merged publisher uses ad prices to internalize the substitution effects on the reader side through readers' preference for advertising. A higher ad price for a given magazine would lead some (ad loving) readers to switch to other magazines, but a merged publisher would recapture some of the lost readers with newly acquired magazines.

Tables A7 and A8 summarize merger effects when magazines are distributed for free in the case of the BMK and WAZ merger. The results under the *Baseline* heading are those of the main specification reported in Tables 5 and 6. Table A7 shows that ad prices increase much more substantially than in the baseline case. The industry-wide sales-weighted average ad price change is 38.14%, which is more than ten times higher than the average ad price change in the baseline model. Table A8 shows that output effects on the advertising side are much larger than in the baseline model, which is not surprising given the larger ad price effects. This table also shows that magazine sales are predicted to decrease for more magazines than in the baseline model. The industry-wide sales-weighted average sales decrease is 7.82% as compared to 5.83% in the baseline model.

The results of the two special cases of the two-sided market model suggest that analyzing merger effects with models that do not fully account for the two-sidedness of the market can have significant limitations and may lead to misleading conclusions with respect to the magnitude of merger effects.

Table A1: Average Price and Market Share in Equilibrium

	Two-sided Single Homing				Competitive Bottleneck			
	Group A		Group B		Group A		Group B	
Platform	Price	Share	Price	Share	Price	Share	Price	Share
1	0.732	0.133	0.052	0.175	0.292	0.056	0.768	0.401
2	0.891	0.132	0.207	0.172	0.145	0.079	1.905	0.347
3	1.059	0.133	0.353	0.179	-0.141	0.146	4.856	0.439
4	1.225	0.138	0.495	0.187	-0.311	0.260	11.425	0.482
5	1.401	0.134	0.689	0.177	-0.339	0.416	22.809	0.503

The market size is set to $M_A/M_B = 10$ for both models.

Table A2: Average Own-Price Elasticities

	Two-sided Single Homing				Competitive Bottleneck			
	Group A		Group B		Group A		Group B	
Platform	Direct	Total	Direct	Total	Direct	Total	Direct	Total
1	-1.274	-1.301	-0.313	-0.320	-0.903	-1.197	-1.722	-2.073
2	-1.551	-1.585	-0.464	-0.472	-0.916	-1.261	-1.445	-1.870
3	-1.842	-1.884	-0.646	-0.658	-0.937	-1.458	-1.083	-1.580
4	-2.119	-2.170	-0.873	-0.890	-0.932	-1.517	-0.955	-1.392
5	-2.430	-2.486	-1.158	-1.183	-0.764	-1.239	-0.947	-1.259

The market size is set to $M_A/M_B = 10$ for both models.

Table A3: Alternative market sizes in the case of BMK and WAZ merger: price changes

				$M_2 = 149$		$M_2 = 155$	
	Freq	Price	Ad Price	ΔPrice	ΔAd price	ΔPrice	ΔAd price
BMK1	6	1.53	51,328	0.06%	-0.17%	2.13%	-0.39%
BMK2	13	1.43	32,811	-0.01%	0.01%	-0.88%	1.06%
BMK3	13	1.05	33,678	-0.02%	0.01%	-1.87%	1.57%
BMK4	13	1.05	24,514	-0.01%	0.01%	-1.03%	0.75%
BMK5	6	0.96	37,275	-0.04%	-0.02%	3.32%	-0.26%
BMK6	3	0.94	17,133	0.95%	0.09%	57.23%	13.80%
BMK7	13	0.75	16,032	-0.01%	0.00%	-1.46%	0.60%
ASV1	6	1.58	46,418	0.07%	-0.19%	0.28%	2.97%
ASV2	13	1.43	39,227	-0.00%	0.00%	-0.37%	0.20%
ASV3	13	1.05	7,347	-0.01%	0.00%	-0.46%	0.09%
ASV4	13	0.75	8,397	-0.01%	0.00%	-0.60%	0.05%
WAZ1	13	1.05	4,967	-0.07%	0.07%	-8.77%	10.90%
WAZ2	13	1.05	3,343	-0.05%	0.05%	-5.98%	6.70%
WAZ3	6	0.96	14,565	-0.16%	0.00%	32.29%	-5.00%
WAZ4	3	0.95	8,930	1.02%	0.26%	68.50%	48.10%

The (optimal) GMM estimates of the nested logit model for the third quarter of 2009 are used. The market size for readers is set to 40 million.

Table A4: Alternative market sizes in the case of BMK and WAZ merger: quantity changes

				$M_2 = 149$		$M_2 = 155$	
	Freq	Sales†	Ads	ΔSales	ΔAds	ΔSales	ΔAds
BMK1	6	1.50	233	-0.01%	0.16%	-0.36%	0.03%
BMK2	13	0.89	107	0.02%	0.03%	2.83%	2.47%
BMK3	13	1.30	85	0.04%	0.05%	5.06%	5.06%
BMK4	13	0.54	89	0.01%	0.02%	2.18%	2.06%
BMK5	6	2.40	200	0.32%	0.37%	-0.49%	-0.22%
BMK6	3	0.63	17	-0.41%	-0.89%	-21.38%	-44.42%
BMK7	13	0.30	56	0.02%	0.03%	2.13%	2.41%
ASV1	6	1.70	220	-0.12%	0.07%	3.21%	0.21%
ASV2	13	1.40	136	0.00%	0.00%	0.49%	0.38%
ASV3	13	0.18	66	0.00%	0.01%	0.30%	0.33%
ASV4	13	0.13	48	0.00%	0.00%	0.19%	0.23%
WAZ1	13	0.20	100	0.23%	0.27%	33.18%	28.97%
WAZ2	13	0.10	89	0.17%	0.21%	20.49%	19.11%
WAZ3	6	1.10	115	0.37%	0.49%	-43.81%	-47.90%
WAZ4	3	0.58	33	-0.79%	-1.61%	-36.18%	-71.54%

The (optimal) GMM estimates of the nested logit model for the third quarter of 2009 are used. The market size for readers is set to 40 million.
†In millions.

Table A5: Merger effects with no feedback loop effects: price changes in the BMK and WAZ merger

				Baseline		No feedback loop effects	
	Freq	Price	Ad Price	ΔPrice	ΔAd price	ΔPrice	ΔAd price
BMK1	6	1.53	51,328	1.10%	1.98%	7.71%	-36.19%
BMK2	13	1.43	32,811	-0.35%	0.52%	-21.16%	20.21%
BMK3	13	1.05	33,678	-0.80%	0.75%	-42.54%	43.27%
BMK4	13	1.05	24,514	-0.40%	0.39%	-23.16%	12.63%
BMK5	6	0.96	37,275	1.75%	1.74%	81.85%	-27.78%
BMK6	3	0.94	17,133	58.63%	13.14%	74.83%	59.90%
BMK7	13	0.75	16,032	-0.61%	0.33%	-26.28%	8.66%
ASV1	6	1.58	46,418	0.22%	3.54%	11.82%	-28.56%
ASV2	13	1.43	39,227	-0.01%	-0.03%	-29.92%	36.89%
ASV3	13	1.05	7,347	-0.03%	-0.02%	-21.53%	11.75%
ASV4	13	0.75	8,397	-0.05%	-0.01%	-22.24%	5.78%
WAZ1	13	1.05	4,967	-4.80%	5.57%	-52.07%	59.26%
WAZ2	13	1.05	3,343	-3.60%	3.91%	-37.65%	34.15%
WAZ3	6	0.96	14,565	61.28%	-9.33%	84.18%	4.96%
WAZ4	3	0.95	8,930	70.88%	45.78%	86.11%	84.20%

The (optimal) GMM estimates of the nested logit model for the third quarter of 2009 are used. The market size for readers is set to 40 million.

Table A6: Merger effects with no feedback loop effects: sales and ad changes in the BMK and WAZ merger

				Baseline		No feedback loop effects	
	Freq	Sales†	Ads	ΔSales	ΔAds	ΔSales	ΔAds
BMK1	6	1.50	233	2.13%	0.14%	-52.34%	-25.03%
BMK2	13	0.89	107	1.48%	1.44%	42.31%	27.84%
BMK3	13	1.30	85	2.56%	2.82%	115.49%	82.13%
BMK4	13	0.54	89	1.20%	1.26%	26.50%	19.35%
BMK5	6	2.40	200	3.90%	2.10%	-75.04%	-72.71%
BMK6	3	0.63	17	-21.86%	-46.59%	-30.16%	-77.58%
BMK7	13	0.30	56	1.24%	1.52%	20.44%	18.64%
ASV1	6	1.70	220	4.49%	0.87%	-53.47%	-36.02%
ASV2	13	1.40	136	-0.09%	-0.08%	85.42%	50.58%
ASV3	13	0.18	66	-0.06%	-0.08%	27.01%	22.90%
ASV4	13	0.13	48	-0.04%	-0.06%	13.23%	12.36%
WAZ1	13	0.20	100	18.00%	18.03%	170.66%	109.34%
WAZ2	13	0.10	89	12.81%	13.41%	87.32%	63.52%
WAZ3	6	1.10	115	-64.34%	-73.42%	-64.60%	-79.44%
WAZ4	3	0.58	33	-37.16%	-73.93%	-43.34%	-86.18%

The (optimal) GMM estimates of the nested logit model for the third quarter of 2009 are used. The market size for readers is set to 40 million.
†In millions.

Table A7: Merger effects when magazines are free: ad price changes in the BMK and WAZ merger

				Baseline		Free magazines	
	Freq	Price	Ad Price	ΔPrice	ΔAd price	ΔPrice	ΔAd price
BMK1	6	1.53	51,328	1.10%	1.98%		74.48%
BMK2	13	1.43	32,811	-0.35%	0.52%		12.55%
BMK3	13	1.05	33,678	-0.80%	0.75%		3.90%
BMK4	13	1.05	24,514	-0.40%	0.39%		10.28%
BMK5	6	0.96	37,275	1.75%	1.74%		31.46%
BMK6	3	0.94	17,133	58.63%	13.14%		54.48%
BMK7	13	0.75	16,032	-0.61%	0.33%		7.77%
ASV1	6	1.58	46,418	0.22%	3.54%		59.97%
ASV2	13	1.43	39,227	-0.01%	-0.03%		19.70%
ASV3	13	1.05	7,347	-0.03%	-0.02%		14.88%
ASV4	13	0.75	8,397	-0.05%	-0.01%		8.86%
WAZ1	13	1.05	4,967	-4.80%	5.57%		27.01%
WAZ2	13	1.05	3,343	-3.60%	3.91%		24.36%
WAZ3	6	0.96	14,565	61.28%	-9.33%		64.78%
WAZ4	3	0.95	8,930	70.88%	45.78%		101.97%

The (optimal) GMM estimates of the nested logit model for the third quarter of 2009 are used. The market size for readers is set to 40 million.

Table A8: Merger effects when magazines are free: sales and ad changes in the BMK and WAZ merger

				Baseline		Free magazines	
	Freq	Sales†	Ads	ΔSales	ΔAds	ΔSales	ΔAds
BMK1	6	1.50	233	2.13%	0.14%	-29.91%	-44.06%
BMK2	13	0.89	107	1.48%	1.44%	-1.88%	-16.47%
BMK3	13	1.30	85	2.56%	2.82%	0.68%	-5.84%
BMK4	13	0.54	89	1.20%	1.26%	-0.89%	-14.27%
BMK5	6	2.40	200	3.90%	2.10%	-11.58%	-24.94%
BMK6	3	0.63	17	-21.86%	-46.59%	-3.28%	-52.47%
BMK7	13	0.30	56	1.24%	1.52%	0.32%	-11.97%
ASV1	6	1.70	220	4.49%	0.87%	-24.46%	-38.97%
ASV2	13	1.40	136	-0.09%	-0.08%	-4.59%	-23.09%
ASV3	13	0.18	66	-0.06%	-0.08%	-1.07%	-20.72%
ASV4	13	0.13	48	-0.04%	-0.06%	0.34%	-13.80%
WAZ1	13	0.20	100	18.00%	18.03%	-4.58%	-31.32%
WAZ2	13	0.10	89	12.81%	13.41%	-3.59%	-29.48%
WAZ3	6	1.10	115	-64.34%	-73.42%	-13.79%	-48.28%
WAZ4	3	0.58	33	-37.16%	-73.93%	-13.86%	-66.72%

The (optimal) GMM estimates of the nested logit model for the third quarter of 2009 are used. The market size for readers is set to 40 million.
†In millions.