

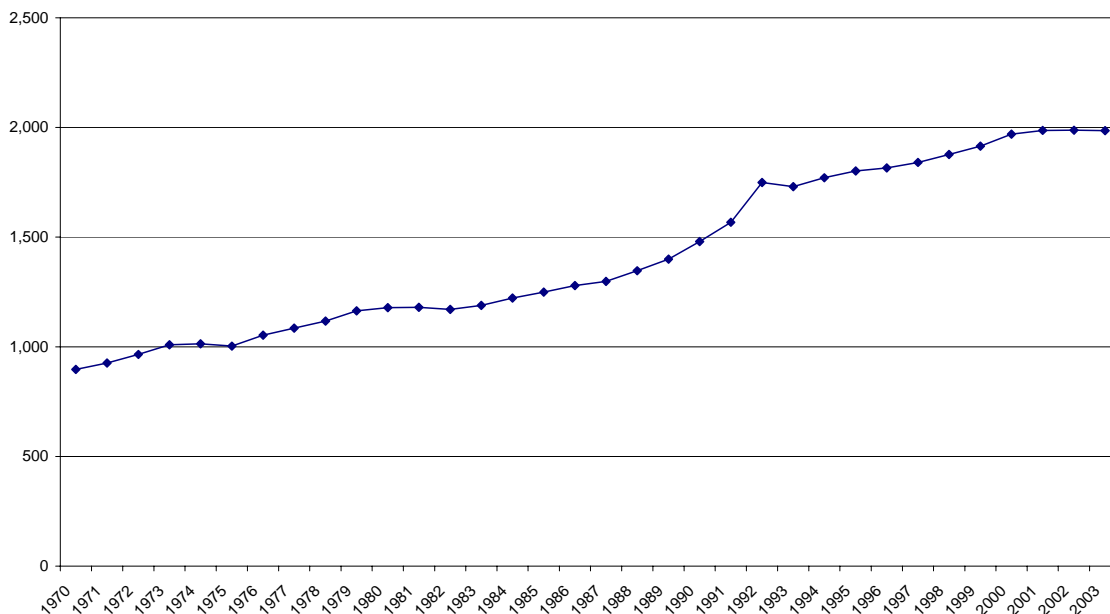
## Alternative models:

The estimation of the alternative monopoly models requires proxy variables for market size, one for the size of the advertising market, the other for the size of the reader market.

We choose total population over 14 years of age in West Germany as proxy variable for reader market size. We exclude the East German population since East Germany had its own magazines that went out of business straight after reunification. East Germans very slowly adopted West German magazines but today still prefer to buy their "own" magazines that focus on issues specific to East Germany. The leading in terms of circulation magazine in East Germany for example is "Super Illu" which reaches 39 percent more readers than the four leading German magazines taken together. By contrast, its market share in West Germany is close to zero. None of the "East German" magazines are part of our data which means that there is no structural break in our circulation data.

Our proxy variable for market size on the advertising market is total GDP (measured in 1995 prices) for Germany. It is well known that advertising demand reacts sensitively to change in the business climate (which we measure as GDP). There is no jump in the GDP series after reunification since East German was negligibly small compared to the West German one (see figure below).

GDP in 1995 prices 1970-1990 West Germany; 1991-2003 West and East Germany



# Monopoly-monopoly model

**A1: both sides monopoly, "our" ad demand specification**

$$\Delta \log(S_{1t}) = \gamma_1 \Delta N_{1t}^a + \varphi_1 \Delta N_{1t}^c - \beta_1 \Delta p_{1t}$$

$$\Delta \log(S_{2t}) = \gamma_1 \Delta N_{2t}^a + \varphi_1 \Delta N_{2t}^c - \beta_1 \Delta p_{2t}$$

$$\Delta \log(N_{1t}^a) = \rho_1 \Delta S_{1t} - \eta_1 \Delta a_{1t}$$

$$\Delta \log(N_{2t}^a) = \rho_1 \Delta S_{2t} - \eta_1 \Delta a_{2t}$$

Test of overidentifying restrictions = 29.4675 [.988]  
 Number of observations = 91 E'PZ\*E = .323819

| Parameter | Estimate    | Standard Error | t-statistic | P-value |
|-----------|-------------|----------------|-------------|---------|
| GAMMA1    | .566869E-03 | .804261E-04    | 7.04832     | [.000]  |
| PSI1      | .172297E-03 | .429336E-04    | 4.01310     | [.000]  |
| BETA1     | .169371     | .053164        | 3.18582     | [.001]  |
| BPOP11    | -113.778    | 26.2313        | -4.33750    | [.000]  |
| BPOP12    | 13.3836     | 3.07939        | 4.34618     | [.000]  |
| TS11      | .421460E-02 | .540268E-02    | .780094     | [.435]  |
| RHO1      | .130976E-05 | .781259E-07    | 16.7647     | [.000]  |
| ETA1      | .936459E-04 | .205490E-04    | 4.55720     | [.000]  |
| BGDP11    | 72.5920     | 10.1110        | 7.17949     | [.000]  |
| BGDP12    | -5.04862    | .695554        | -7.25842    | [.000]  |
| TN11      | .045553     | .739011E-02    | 6.16404     | [.000]  |

ela reader wrt ads

=====

|                        | X       | STD      | TVAL    |        |
|------------------------|---------|----------|---------|--------|
| Value                  | 0.38169 | 0.054154 | 7.04832 |        |
| NORMAL Test Statistic: |         |          |         | .00000 |

ela reader wrt content

=====

|                        | X       | STD      | TVAL    |        |
|------------------------|---------|----------|---------|--------|
| Value                  | 0.34510 | 0.085992 | 4.01310 |        |
| NORMAL Test Statistic: |         |          |         | .00006 |

ela reader wrt price

=====

|                        | X       | STD     | TVAL    |        |
|------------------------|---------|---------|---------|--------|
| Value                  | 0.48333 | 0.15171 | 3.18582 |        |
| NORMAL Test Statistic: |         |         |         | .00144 |

ela adv wrt readers

=====

|                        | X       | STD      | TVAL     |        |
|------------------------|---------|----------|----------|--------|
| Value                  | 1.25157 | 0.074655 | 16.76468 |        |
| NORMAL Test Statistic: |         |          |          | .00000 |

ela adv wrt price

=====

|                        | X       | STD     | TVAL    |        |
|------------------------|---------|---------|---------|--------|
| Value                  | 0.98439 | 0.21601 | 4.55720 |        |
| NORMAL Test Statistic: |         |         |         | .00001 |

```

                reader wtp for content
                =====
                X          STD          TVAL
Value      23462.49614    8519.24249    2.75406
NORMAL Test Statistic: 2.754059, Two-tailed area: .00589

                reader wtp for ads
                =====
                X          STD          TVAL
Value      24384.83250    8133.41741    2.99810
NORMAL Test Statistic: 2.998104, Two-tailed area: .00272

                reader wtp ad-reader wtp content=0?
                =====
                X          STD          TVAL
Value      -922.33636    8617.00708    -0.10704
NORMAL Test Statistic: -0.1070367, Two-tailed area: .91476

                adv wtp readers
                =====
                X          STD          TVAL
Value      101900.84683    20800.01702    4.89908
NORMAL Test Statistic: 4.899075, Two-tailed area: .00000

                reader wtp ad-ad wtp readers=0?
                =====
                X          STD          TVAL
Value      -77516.01433    17951.04576    -4.31819
NORMAL Test Statistic: -4.318189, Two-tailed area: .00002

                nonexplosive network effects
                =====
                X          STD          TVAL
Value      0.45906        0.079030        5.80865
NORMAL Test Statistic: 5.808653, Two-tailed area: .00000

                usual markup 1/beta
                =====
                X          STD          TVAL
Value      5.90420        1.85328         3.18582
NORMAL Test Statistic: 3.185820, Two-tailed area: .00144

                usual markup 1/eta
                =====
                X          STD          TVAL
Value      10678.52574    3.51146D+08    0.000030411
NORMAL Test Statistic: 0.3041052E-04, Two-tailed area: .99998

                advertising feedback on price rho*Na/eta
                =====
                X          STD          TVAL
Value      9.41745        1.92229         4.89908
NORMAL Test Statistic: 4.899075, Two-tailed area: .00000

                reader feedback on adrate gamma*S/beta
                =====
                X          STD          TVAL
Value      3198.22627    1066.74956     2.99810
NORMAL Test Statistic: 2.998104, Two-tailed area: .00272

                profit contr readers
                =====
                X          STD          TVAL
Value      -3.35718D+06  1830917.95914   -1.83360
NORMAL Test Statistic: -1.833603, Two-tailed area: .06671

```

```
profit contr ads
=====
Value      X          STD          TVAL
5036751.17409 1516434.51921      3.32144
NORMAL Test Statistic: 3.321443, Two-tailed area: .00090
```

**A2: competition on both sides**

Allow for unrestricted cross-effects on all variables

$$\Delta \log(S_{1t}) = \gamma_1 \Delta N_{1t}^a - \gamma_2 \Delta N_{2t}^a + \varphi_1 \Delta N_{1t}^c - \varphi_2 \Delta N_{2t}^c - \beta_1 \Delta p_{1t} + \beta_2 \Delta p_{2t}$$

$$\Delta \log(S_{2t}) = \gamma_1 \Delta N_{2t}^a - \gamma_2 \Delta N_{1t}^a + \varphi_1 \Delta N_{2t}^c - \varphi_2 \Delta N_{1t}^c - \beta_1 \Delta p_{2t} + \beta_2 \Delta p_{1t}$$

$$\Delta \log(N_{1t}^a) = \rho_1 \Delta S_{1t} - \rho_2 \Delta S_{2t} - \eta_1 \Delta a_{1t} + \eta_2 \Delta a_{2t}$$

$$\Delta \log(N_{2t}^a) = \rho_1 \Delta S_{2t} - \rho_2 \Delta S_{1t} - \eta_1 \Delta a_{2t} + \eta_2 \Delta a_{1t}$$

Test of overidentifying restrictions = 34.3132 [1.00]  
 Number of observations = 91 E'PZ\*E = .377068

| Parameter | Estimate     | Standard Error | t-statistic | P-value |
|-----------|--------------|----------------|-------------|---------|
| GAMMA1    | .784194E-03  | .321097E-04    | 24.4223     | [.000]  |
| GAMMA2    | -.375903E-04 | .175423E-04    | -2.14283    | [.032]  |
| PSI1      | .106991E-03  | .159934E-04    | 6.68973     | [.000]  |
| PSI2      | -.651199E-04 | .910042E-05    | -7.15570    | [.000]  |
| BETA1     | .169154      | .020470        | 8.26348     | [.000]  |
| BETA2     | .124069      | .016571        | 7.48725     | [.000]  |
| BPOP11    | -139.790     | 16.9228        | -8.26048    | [.000]  |
| BPOP12    | 16.4334      | 1.98570        | 8.27587     | [.000]  |
| TS11      | -.567234E-02 | .231688E-02    | -2.44826    | [.014]  |
| RHO1      | .145473E-05  | .462890E-07    | 31.4272     | [.000]  |
| RHO2      | .451142E-07  | .488182E-07    | .924127     | [.355]  |
| ETA1      | .109491E-03  | .664036E-05    | 16.4888     | [.000]  |
| ETA2      | .656656E-04  | .643040E-05    | 10.2117     | [.000]  |
| BGDP11    | 46.1657      | 2.94651        | 15.6679     | [.000]  |
| BGDP12    | -3.24468     | .197435        | -16.4342    | [.000]  |
| TN11      | .038672      | .442379E-02    | 8.74173     | [.000]  |

Significance of comp. magazine

=====

WALD = 56.02413

CHISQ(5) Test Statistic: 56.02413, Upper tail area: .00000

Significance of comp. magazine: reader market

=====

WALD = 55.94728

CHISQ(3) Test Statistic: 55.94728, Upper tail area: .00000

Significance of comp. magazine: ad market

=====

WALD = 103.68198

CHISQ(2) Test Statistic: 103.6820, Upper tail area: .00000

|   |
|---|
| <b>A2_Ci Monopoly model with cross-effects on reader prices</b> |
|---|

$$\Delta \log(S_{1t}) = \gamma_1 \Delta N_{1t}^a + \varphi_1 \Delta N_{1t}^c - \beta_1 \Delta p_{1t} + \beta_2 \Delta p_{2t}$$

$$\Delta \log(S_{2t}) = \gamma_1 \Delta N_{2t}^a + \varphi_1 \Delta N_{2t}^c - \beta_1 \Delta p_{2t} + \beta_2 \Delta p_{1t}$$

$$\Delta \log(N_{1t}^a) = \rho_1 \Delta S_{1t} - \eta_1 \Delta a_{1t}$$

$$\Delta \log(N_{2t}^a) = \rho_1 \Delta S_{2t} - \eta_1 \Delta a_{2t}$$

Test of overidentifying restrictions = 37.9662 [.988]  
 Number of observations = 91 E'PZ\*E = .417210

| Parameter | Estimate     | Standard Error | t-statistic | P-value |
|-----------|--------------|----------------|-------------|---------|
| GAMMA1    | .569428E-03  | .484329E-04    | 11.7571     | [.000]  |
| PSI1      | .143336E-03  | .219771E-04    | 6.52210     | [.000]  |
| BETA1     | .119689      | .042882        | 2.79112     | [.005]  |
| BETA2     | .162427      | .036042        | 4.50664     | [.000]  |
| BPOP11    | -102.329     | 23.2626        | -4.39885    | [.000]  |
| BPOP12    | 12.0391      | 2.72986        | 4.41013     | [.000]  |
| TS11      | -.931630E-02 | .407869E-02    | -2.28414    | [.022]  |
| RHO1      | .135693E-05  | .797353E-07    | 17.0180     | [.000]  |
| ETA1      | .627677E-04  | .155692E-04    | 4.03152     | [.000]  |
| BGDP11    | 74.3655      | 8.14422        | 9.13108     | [.000]  |
| BGDP12    | -5.17644     | .561509        | -9.21879    | [.000]  |
| TN11      | .036008      | .490582E-02    | 7.33994     | [.000]  |

**A2\_Cii Monopoly model with cross-effects on ad prices**

$$\Delta \log(S_{1t}) = \gamma_1 \Delta N_{1t}^a + \varphi_1 \Delta N_{1t}^c - \beta_1 \Delta p_{1t}$$

$$\Delta \log(S_{2t}) = \gamma_1 \Delta N_{2t}^a + \varphi_1 \Delta N_{2t}^c - \beta_1 \Delta p_{2t}$$

$$\Delta \log(N_{1t}^a) = \rho_1 \Delta S_{1t} - \eta_1 \Delta a_{1t} + \eta_2 \Delta a_{2t}$$

$$\Delta \log(N_{2t}^a) = \rho_1 \Delta S_{2t} - \eta_1 \Delta a_{2t} + \eta_2 \Delta a_{1t}$$

Test of overidentifying restrictions = 47.3565 [.989]  
 Number of observations = 91 E'PZ\*E = .520401

| Parameter | Estimate    | Standard Error | t-statistic | P-value |
|-----------|-------------|----------------|-------------|---------|
| GAMMA1    | .824519E-03 | .208701E-04    | 39.5073     | [.000]  |
| PSI1      | .112851E-03 | .123906E-04    | 9.10777     | [.000]  |
| BETA1     | .211775     | .029028        | 7.29560     | [.000]  |
| BPOP11    | -118.654    | 18.0780        | -6.56346    | [.000]  |
| BPOP12    | 13.9557     | 2.12257        | 6.57491     | [.000]  |
| TS11      | .509945E-02 | .275300E-02    | 1.85232     | [.064]  |
| RHO1      | .137509E-05 | .255650E-07    | 53.7881     | [.000]  |
| ETA1      | .101178E-03 | .459235E-05    | 22.0319     | [.000]  |
| ETA2      | .736565E-04 | .458619E-05    | 16.0605     | [.000]  |
| BGDP11    | 49.9755     | 2.51522        | 19.8692     | [.000]  |
| BGDP12    | -3.51614    | .171053        | -20.5558    | [.000]  |
| TN11      | .036835     | .336200E-02    | 10.9563     | [.000]  |

Significance of comp. magazine

=====

WALD = 1.71939D-11

CHISQ(2) Test Statistic: 0.1719393E-10, Upper tail area: 1.0000

**A2\_Ciii Monopoly model with cross-effects on both prices**

$$\Delta \log(S_{1t}) = \gamma_1 \Delta N_{1t}^a + \varphi_1 \Delta N_{1t}^c - \beta_1 \Delta p_{1t} + \beta_2 \Delta p_{2t}$$

$$\Delta \log(S_{2t}) = \gamma_1 \Delta N_{2t}^a + \varphi_1 \Delta N_{2t}^c - \beta_1 \Delta p_{2t} + \beta_2 \Delta p_{1t}$$

$$\Delta \log(N_{1t}^a) = \rho_1 \Delta S_{1t} - \eta_1 \Delta a_{1t} + \eta_2 \Delta a_{2t}$$

$$\Delta \log(N_{2t}^a) = \rho_1 \Delta S_{2t} - \eta_1 \Delta a_{2t} + \eta_2 \Delta a_{1t}$$

Test of overidentifying restrictions = 45.1246 [.982]  
 Number of observations = 91 E'PZ\*E = .495875

| Parameter | Estimate     | Standard Error | t-statistic | P-value |
|-----------|--------------|----------------|-------------|---------|
| GAMMA1    | .808123E-03  | .281670E-04    | 28.6904     | [.000]  |
| PSI1      | .118778E-03  | .163682E-04    | 7.25661     | [.000]  |
| BETA1     | .195259      | .036237        | 5.38841     | [.000]  |
| BETA2     | .126509      | .026454        | 4.78224     | [.000]  |
| BPOP11    | -117.818     | 18.4195        | -6.39635    | [.000]  |
| BPOP12    | 13.8481      | 2.16182        | 6.40577     | [.000]  |
| TS11      | -.320596E-02 | .327864E-02    | -.977831    | [.328]  |
| RHO1      | .141872E-05  | .523654E-07    | 27.0927     | [.000]  |
| ETA1      | .103331E-03  | .672592E-05    | 15.3630     | [.000]  |
| ETA2      | .662652E-04  | .897332E-05    | 7.38469     | [.000]  |
| BGDP11    | 50.4792      | 3.92659        | 12.8557     | [.000]  |
| BGDP12    | -3.54774     | .268259        | -13.2250    | [.000]  |
| TN11      | .038049      | .362250E-02    | 10.5036     | [.000]  |

Significance of comp. magazine: ad market  
 =====

WALD = 50.21369  
 CHISQ(4) Test Statistic: 50.21369, Upper tail area: .00000

# Competitive bottleneck model

C2: competition on reader market with all restrictions, monopoly on ad market

$$\Delta \log(S_{1t}) = \gamma_1 \Delta N_{1t}^a - \gamma_1 \Delta N_{2t}^a + \varphi_1 \Delta N_{1t}^c - \varphi_1 \Delta N_{2t}^c - \beta_1 \Delta p_{1t} + \beta_1 \Delta p_{2t}$$

$$\Delta \log(S_{2t}) = \gamma_1 \Delta N_{2t}^a - \gamma_1 \Delta N_{1t}^a + \varphi_1 \Delta N_{2t}^c - \varphi_1 \Delta N_{1t}^c - \beta_1 \Delta p_{2t} + \beta_1 \Delta p_{1t}$$

$$\Delta \log(N_{1t}^a) = \rho_1 \Delta S_{1t} - \eta_1 \Delta a_{1t}$$

$$\Delta \log(N_{2t}^a) = \rho_1 \Delta S_{2t} - \eta_1 \Delta a_{2t}$$

Test of overidentifying restrictions = 27.4956 [1.00]  
 Number of observations = 91 E'PZ\*E = .302149

| Parameter | Estimate    | Standard Error | t-statistic | P-value |
|-----------|-------------|----------------|-------------|---------|
| GAMMA1    | .458565E-03 | .151687E-04    | 30.2310     | [.000]  |
| PSI1      | .206377E-05 | .668570E-05    | .308685     | [.758]  |
| BETA1     | .164455     | .020123        | 8.17245     | [.000]  |
| BPOP11    | -110.194    | 18.7264        | -5.88438    | [.000]  |
| BPOP12    | 12.9335     | 2.20027        | 5.87814     | [.000]  |
| TS11      | .011513     | .142615E-02    | 8.07298     | [.000]  |
| RHO1      | .116200E-05 | .488225E-07    | 23.8004     | [.000]  |
| ETA1      | .107418E-03 | .971731E-05    | 11.0543     | [.000]  |
| BGDP11    | 51.5531     | 5.64283        | 9.13604     | [.000]  |
| BGDP12    | -3.66643    | .388744        | -9.43149    | [.000]  |
| TN11      | .075411     | .378732E-02    | 19.9115     | [.000]  |

ela reader wrt ads

=====

|                        | X                                 | STD      | TVAL     |
|------------------------|-----------------------------------|----------|----------|
| Value                  | 0.30877                           | 0.010214 | 30.23103 |
| NORMAL Test Statistic: | 30.23103, Two-tailed area: .00000 |          |          |

ela reader wrt content

=====

|                        | X                                  | STD      | TVAL    |
|------------------------|------------------------------------|----------|---------|
| Value                  | 0.0041336                          | 0.013391 | 0.30868 |
| NORMAL Test Statistic: | 0.3086845, Two-tailed area: .75756 |          |         |

ela reader wrt price

=====

|                        | X                                 | STD      | TVAL    |
|------------------------|-----------------------------------|----------|---------|
| Value                  | 0.46930                           | 0.057425 | 8.17245 |
| NORMAL Test Statistic: | 8.172449, Two-tailed area: .00000 |          |         |

ela adv wrt readers

=====

|                        | X                                  | STD     | TVAL    |
|------------------------|------------------------------------|---------|---------|
| Value                  | 1.11038                            | 9.28564 | 0.11958 |
| NORMAL Test Statistic: | 0.1195801, Two-tailed area: .90482 |         |         |

ela adv wrt price

=====

|                        | X                                 | STD     | TVAL     |
|------------------------|-----------------------------------|---------|----------|
| Value                  | 1.12915                           | 0.10215 | 11.05426 |
| NORMAL Test Statistic: | 11.05426, Two-tailed area: .00000 |         |          |

reader wtp for content

=====

|                        | X                                  | STD       | TVAL    |
|------------------------|------------------------------------|-----------|---------|
| Value                  | 289.43363                          | 920.54510 | 0.31442 |
| NORMAL Test Statistic: | 0.3144155, Two-tailed area: .75321 |           |         |

```

reader wtp for ads
=====
Value          X          STD          TVAL
20315.55849    2544.05175    7.98551
NORMAL Test Statistic: 7.985513, Two-tailed area: .00000

```

```

reader wtp ad-reader wtp content=0?
=====
Value          X          STD          TVAL
-20026.12486   3141.76668   -6.37416
NORMAL Test Statistic: -6.374160, Two-tailed area: .00000

```

```

adv wtp readers
=====
Value          X          STD          TVAL
78814.35750    6466.40218   12.18829
NORMAL Test Statistic: 12.18829, Two-tailed area: .00000

```

```

reader wtp ad-ad wtp readers=0?
=====
Value          X          STD          TVAL
-58498.79901   5006.10353   -11.68550
NORMAL Test Statistic: -11.68550, Two-tailed area: .00000

```

```

reader price-cost margin: usual markup
=====
Value          X          STD          TVAL
6.08068        0.74405      8.17245
NORMAL Test Statistic: 8.172449, Two-tailed area: .00000

```

```

advertiser price-cost margin: usual markup
=====
Value          X          STD          TVAL
9309.45446     842.15991    11.05426
NORMAL Test Statistic: 11.05426, Two-tailed area: .00000

```

```

nonexplosive network effects
=====
Value          X          STD          TVAL
0.61178        0.021290     28.73477
NORMAL Test Statistic: 28.73477, Two-tailed area: .00000

```

```

profit contr readers
=====
Value          X          STD          TVAL
3554761.39127 1081373.52202 3.28727
NORMAL Test Statistic: 3.287265, Two-tailed area: .00101

```

```

profit contr ads
=====
Value          X          STD          TVAL
4474273.60687 714754.62855 6.25987
NORMAL Test Statistic: 6.259874, Two-tailed area: .00000

```

|   |
|---|
| <b>C3i: competition vs bottleneck, cross-price only</b> |
|---|

$$\Delta \log(S_{1t}) = \gamma_1 \Delta N_{1t}^a - \gamma_1 \Delta N_{2t}^a + \varphi_1 \Delta N_{1t}^c - \varphi_1 \Delta N_{2t}^c - \beta_1 \Delta p_{1t} + \beta_1 \Delta p_{2t}$$

$$\Delta \log(S_{2t}) = \gamma_1 \Delta N_{2t}^a - \gamma_1 \Delta N_{1t}^a + \varphi_1 \Delta N_{2t}^c - \varphi_1 \Delta N_{1t}^c - \beta_1 \Delta p_{2t} + \beta_1 \Delta p_{1t}$$

$$\Delta \log(N_{1t}^a) = \rho_1 \Delta S_{1t} - \eta_1 \Delta a_{1t} + \eta_2 \Delta a_{2t}$$

$$\Delta \log(N_{2t}^a) = \rho_1 \Delta S_{2t} - \eta_1 \Delta a_{2t} + \eta_2 \Delta a_{1t}$$

Test of overidentifying restrictions = 47.1523 [.994]  
 Number of observations = 91 E'PZ\*E = .518157

| Parameter | Estimate    | Standard Error | t-statistic | P-value |
|-----------|-------------|----------------|-------------|---------|
| GAMMA1    | .463160E-03 | .150225E-04    | 30.8311     | [.000]  |
| PSI1      | .115979E-04 | .693133E-05    | 1.67326     | [.094]  |
| BETA1     | .149461     | .014587        | 10.2465     | [.000]  |
| BPOP11    | -114.573    | 11.4947        | -9.96753    | [.000]  |
| BPOP12    | 13.4423     | 1.34840        | 9.96912     | [.000]  |
| TS11      | .971764E-02 | .151031E-02    | 6.43420     | [.000]  |
| RHO1      | .120819E-05 | .168811E-07    | 71.5707     | [.000]  |
| ETA1      | .961112E-04 | .781686E-05    | 12.2954     | [.000]  |
| ETA2      | .692638E-04 | .690336E-05    | 10.0333     | [.000]  |
| BGDP11    | 50.0797     | 4.99094        | 10.0341     | [.000]  |
| BGDP12    | -3.54557    | .335204        | -10.5774    | [.000]  |
| TN11      | .042641     | .458313E-02    | 9.30382     | [.000]  |

**C3iii: competition vs bottleneck, both cross-effects**

$$\Delta \log(S_{1t}) = \gamma_1 \Delta N_{1t}^a - \gamma_1 \Delta N_{2t}^a + \varphi_1 \Delta N_{1t}^c - \varphi_1 \Delta N_{2t}^c - \beta_1 \Delta p_{1t} + \beta_1 \Delta p_{2t}$$

$$\Delta \log(S_{2t}) = \gamma_1 \Delta N_{2t}^a - \gamma_1 \Delta N_{1t}^a + \varphi_1 \Delta N_{2t}^c - \varphi_1 \Delta N_{1t}^c - \beta_1 \Delta p_{2t} + \beta_1 \Delta p_{1t}$$

$$\Delta \log(N_{1t}^a) = \rho_1 \Delta S_{1t} - \rho_2 \Delta S_{2t} - \eta_1 \Delta a_{1t} + \eta_2 \Delta a_{1t}$$

$$\Delta \log(N_{2t}^a) = \rho_1 \Delta S_{2t} - \rho_2 \Delta S_{1t} - \eta_1 \Delta a_{2t} + \eta_2 \Delta a_{2t}$$

Test of overidentifying restrictions = 45.2967 [.996]  
 Number of observations = 91 E'PZ\*E = .497766

| Parameter | Estimate     | Standard Error | t-statistic | P-value |
|-----------|--------------|----------------|-------------|---------|
| GAMMA1    | .416979E-03  | .146288E-04    | 28.5039     | [.000]  |
| PSI1      | .234651E-04  | .507336E-05    | 4.62517     | [.000]  |
| BETA1     | .174990      | .012873        | 13.5938     | [.000]  |
| BPOP11    | -120.854     | 14.0217        | -8.61907    | [.000]  |
| BPOP12    | 14.1793      | 1.64697        | 8.60936     | [.000]  |
| TS11      | .512899E-02  | .143737E-02    | 3.56832     | [.000]  |
| RHO1      | .141096E-05  | .348538E-07    | 40.4821     | [.000]  |
| RHO2      | -.455767E-07 | .611493E-07    | -.745335    | [.456]  |
| ETA1      | .102291E-03  | .668512E-05    | 15.3014     | [.000]  |
| ETA2      | .840093E-04  | .111703E-04    | 7.52081     | [.000]  |
| BGDP11    | 40.6584      | 6.54466        | 6.21245     | [.000]  |
| BGDP12    | -2.87479     | .444903        | -6.46162    | [.000]  |
| TN11      | .033755      | .359077E-02    | 9.40040     | [.000]  |

Significance of comp. magazine: ad market  
 =====

WALD = 56.25544  
 CHISQ(2) Test Statistic: 56.25544, Upper tail area: .00000

# Testing for monopoly

## D1: completely unrestricted model

$$\Delta \log(S_{1t}) = \gamma_1 \Delta N_{1t}^a - \gamma_1 \Delta N_{2t}^a \alpha_r + \varphi_1 \Delta N_{1t}^c - \varphi_1 \Delta N_{2t}^c \alpha_r - \beta_1 \Delta p_{1t} + \beta_1 \Delta p_{2t} \alpha_r$$

$$\Delta \log(S_{2t}) = \gamma_1 \Delta N_{2t}^a - \gamma_1 \Delta N_{1t}^a \alpha_r + \varphi_1 \Delta N_{2t}^c - \varphi_1 \Delta N_{1t}^c \alpha_r - \beta_1 \Delta p_{2t} + \beta_1 \Delta p_{1t} \alpha_r$$

$$\Delta \log(N_{1t}^a) = \rho_1 \Delta S_{1t} - \rho_1 \Delta S_{2t} \alpha_a - \eta_1 \Delta a_{1t} + \eta_1 \Delta a_{2t} \alpha_a$$

$$\Delta \log(N_{2t}^a) = \rho_1 \Delta S_{2t} - \rho_1 \Delta S_{1t} \alpha_a - \eta_1 \Delta a_{2t} + \eta_1 \Delta a_{1t} \alpha_a$$

Test of overidentifying restrictions = 33.9216 [1.00]  
 Number of observations = 91 E'PZ\*E = .372765

| Parameter | Estimate    | Standard Error | t-statistic | P-value |
|-----------|-------------|----------------|-------------|---------|
| GAMMA1    | .433463E-03 | .141183E-04    | 30.7022     | [.000]  |
| PSI1      | .539471E-05 | .428643E-05    | 1.25855     | [.208]  |
| BETA1     | .170606     | .816860E-02    | 20.8856     | [.000]  |
| BPOP11    | -120.086    | 7.05461        | -17.0223    | [.000]  |
| BPOP12    | 14.0888     | .828872        | 16.9976     | [.000]  |
| TS11      | .012807     | .121935E-02    | 10.5027     | [.000]  |
| RHO1      | .994587E-06 | .281013E-07    | 35.3930     | [.000]  |
| ALPHA_A   | .326893     | .040228        | 8.12594     | [.000]  |
| ETA1      | .113547E-03 | .564740E-05    | 20.1060     | [.000]  |
| BGDP11    | 49.2309     | 3.52967        | 13.9477     | [.000]  |
| BGDP12    | -3.49869    | .242144        | -14.4488    | [.000]  |
| TN11      | .064754     | .366932E-02    | 17.6473     | [.000]  |

D2: partly restricted model  $\alpha_r \neq 0, \alpha_a = 0$ ;  
 competition on reader side, no competition on advertiser side

$$\Delta \log(S_{1t}) = \gamma_1 \Delta N_{1t}^a - \gamma_1 \Delta N_{2t}^a \alpha_r + \varphi_1 \Delta N_{1t}^c - \varphi_1 \Delta N_{2t}^c \alpha_r - \beta_1 \Delta p_{1t} + \beta_1 \Delta p_{2t} \alpha_r$$

$$\Delta \log(S_{2t}) = \gamma_1 \Delta N_{2t}^a - \gamma_1 \Delta N_{1t}^a \alpha_r + \varphi_1 \Delta N_{2t}^c - \varphi_1 \Delta N_{1t}^c \alpha_r - \beta_1 \Delta p_{2t} + \beta_1 \Delta p_{1t} \alpha_r$$

$$\Delta \log(N_{1t}^a) = \rho_1 \Delta S_{1t} - \rho_1 \Delta S_{2t} 0 - \eta_1 \Delta a_{1t} + \eta_1 \Delta a_{2t} 0$$

$$\Delta \log(N_{2t}^a) = \rho_1 \Delta S_{2t} - \rho_1 \Delta S_{1t} 0 - \eta_1 \Delta a_{2t} + \eta_1 \Delta a_{1t} 0$$

Test of overidentifying restrictions = 36.4387 [.980]  
 Number of observations = 91 E'PZ\*E = .400425

| Parameter | Estimate     | Standard Error | t-statistic | P-value |
|-----------|--------------|----------------|-------------|---------|
| GAMMA1    | .600515E-03  | .734310E-04    | 8.17795     | [.000]  |
| ALPHA_R   | -.374904     | .072133        | -5.19739    | [.000]  |
| PSI1      | .100140E-03  | .307349E-04    | 3.25820     | [.001]  |
| BETA1     | .071248      | .055485        | 1.28408     | [.199]  |
| BPOP11    | -54.9924     | 31.5658        | -1.74215    | [.081]  |
| BPOP12    | 6.48117      | 3.70547        | 1.74908     | [.080]  |
| TS11      | -.197221E-02 | .483965E-02    | -.407511    | [.684]  |
| RHO1      | .118559E-05  | .854005E-07    | 13.8827     | [.000]  |
| ETA1      | .941974E-04  | .147367E-04    | 6.39204     | [.000]  |
| BGDP11    | 66.4099      | 9.88423        | 6.71877     | [.000]  |
| BGDP12    | -4.59910     | .679103        | -6.77231    | [.000]  |
| TN11      | .036887      | .801243E-02    | 4.60372     | [.000]  |

D3: partly restricted model  $\alpha_r = 0, \alpha_a \neq 0$ ;  
 No competition on reader side, competition on advertiser side

$$\Delta \log(S_{1t}) = \gamma_1 \Delta N_{1t}^a - \gamma_1 \Delta N_{2t}^a 0 + \varphi_1 \Delta N_{1t}^c - \varphi_1 \Delta N_{2t}^c 0 - \beta_1 \Delta p_{1t} + \beta_1 \Delta p_{2t} 0$$

$$\Delta \log(S_{2t}) = \gamma_1 \Delta N_{2t}^a - \gamma_1 \Delta N_{1t}^a 0 + \varphi_1 \Delta N_{2t}^c - \varphi_1 \Delta N_{1t}^c 0 - \beta_1 \Delta p_{2t} + \beta_1 \Delta p_{1t} 0$$

$$\Delta \log(N_{1t}^a) = \rho_1 \Delta S_{1t} - \rho_1 \Delta S_{2t} \alpha_a - \eta_1 \Delta a_{1t} + \eta_1 \Delta a_{2t} \alpha_a$$

$$\Delta \log(N_{2t}^a) = \rho_1 \Delta S_{2t} - \rho_1 \Delta S_{1t} \alpha_a - \eta_1 \Delta a_{2t} + \eta_1 \Delta a_{1t} \alpha_a$$

Test of overidentifying restrictions = 43.1781 [.950]  
 Number of observations = 91 E'PZ\*E = .474484

| Parameter | Estimate    | Standard Error | t-statistic | P-value |
|-----------|-------------|----------------|-------------|---------|
| GAMMA1    | .735403E-03 | .637831E-04    | 11.5297     | [.000]  |
| PSI1      | .116428E-03 | .322905E-04    | 3.60564     | [.000]  |
| BETA1     | .245515     | .045484        | 5.39783     | [.000]  |
| BPOP11    | -142.008    | 31.5431        | -4.50203    | [.000]  |
| BPOP12    | 16.6919     | 3.70432        | 4.50608     | [.000]  |
| TS11      | .997372E-02 | .451016E-02    | 2.21139     | [.027]  |
| RHO1      | .124638E-05 | .683280E-07    | 18.2411     | [.000]  |
| ALPHA_A   | .011952     | .058725        | .203530     | [.839]  |
| ETA1      | .895534E-04 | .121779E-04    | 7.35374     | [.000]  |
| BGDP11    | 71.0129     | 8.49991        | 8.35455     | [.000]  |
| BGDP12    | -4.94065    | .585183        | -8.44291    | [.000]  |
| TN11      | .048676     | .685420E-02    | 7.10166     | [.000]  |

**D4: partly restricted model  $\alpha_r = 1, \alpha_a \neq 0$  ;**  
**No competition on reader side, competition on advertiser side**  
**If  $\alpha_a \neq 0 \rightarrow$  competitive bottleneck rejected**

$$\Delta \log(S_{1t}) = \gamma_1 \Delta N_{1t}^a - \gamma_1 \Delta N_{2t}^a + \varphi_1 \Delta N_{1t}^c - \varphi_1 \Delta N_{2t}^c - \beta_1 \Delta p_{1t} + \beta_1 \Delta p_{2t}$$

$$\Delta \log(S_{2t}) = \gamma_1 \Delta N_{2t}^a - \gamma_1 \Delta N_{1t}^a + \varphi_1 \Delta N_{2t}^c - \varphi_1 \Delta N_{1t}^c - \beta_1 \Delta p_{2t} + \beta_1 \Delta p_{1t}$$

$$\Delta \log(N_{1t}^a) = \rho_1 \Delta S_{1t} - \rho_1 \Delta S_{2t} \alpha_a - \eta_1 \Delta a_{1t} + \eta_1 \Delta a_{2t} \alpha_a$$

$$\Delta \log(N_{2t}^a) = \rho_1 \Delta S_{2t} - \rho_1 \Delta S_{1t} \alpha_a - \eta_1 \Delta a_{2t} + \eta_1 \Delta a_{1t} \alpha_a$$

Test of overidentifying restrictions = 43.1781 [.950]  
 Number of observations = 91 E'PZ\*E = .474484

| Parameter | Estimate    | Standard Error | t-statistic | P-value |
|-----------|-------------|----------------|-------------|---------|
| GAMMA1    | .735403E-03 | .637831E-04    | 11.5297     | [.000]  |
| PSI1      | .116428E-03 | .322905E-04    | 3.60564     | [.000]  |
| BETA1     | .245515     | .045484        | 5.39783     | [.000]  |
| BPOP11    | -142.008    | 31.5431        | -4.50203    | [.000]  |
| BPOP12    | 16.6919     | 3.70432        | 4.50608     | [.000]  |
| TS11      | .997372E-02 | .451016E-02    | 2.21139     | [.027]  |
| RHO1      | .124638E-05 | .683280E-07    | 18.2411     | [.000]  |
| ALPHA_A   | .011952     | .058725        | .203530     | [.839]  |
| ETA1      | .895534E-04 | .121779E-04    | 7.35374     | [.000]  |
| BGDP11    | 71.0129     | 8.49991        | 8.35455     | [.000]  |
| BGDP12    | -4.94065    | .585183        | -8.44291    | [.000]  |
| TN11      | .048676     | .685420E-02    | 7.10166     | [.000]  |

|   |
|---|
| <b>F1: both sides monopoly, alternative ad demand specification</b> |
|---|

$$\Delta \log(S_{1t}) = \gamma_1 \Delta N_{1t}^a + \varphi_1 \Delta N_{1t}^c - \beta_1 \Delta p_{1t}$$

$$\Delta \log(S_{2t}) = \gamma_1 \Delta N_{2t}^a + \varphi_1 \Delta N_{2t}^c - \beta_1 \Delta p_{2t}$$

$$\Delta \log(N_{1t}^a) = -\kappa \Delta \left( \frac{S_{1t}}{a_{1t}} \right)$$

$$\Delta \log(N_{2t}^a) = -\kappa \Delta \left( \frac{S_{2t}}{a_{2t}} \right)$$

Test of overidentifying restrictions = 36.0043 [.932]  
 Number of observations = 91 E'PZ\*E = .395652

| Parameter | Estimate    | Standard Error | t-statistic | P-value |
|-----------|-------------|----------------|-------------|---------|
| GAMMA1    | .100732E-02 | .129412E-03    | 7.78381     | [.000]  |
| PSI1      | .122772E-03 | .490730E-04    | 2.50183     | [.012]  |
| BETA1     | -.070512    | .065438        | -1.07754    | [.281]  |
| BPOP11    | -51.5152    | 35.1093        | -1.46728    | [.142]  |
| BPOP12    | 6.05397     | 4.11998        | 1.46942     | [.142]  |
| TS11      | -.015963    | .598608E-02    | -2.66677    | [.008]  |
| KAPPA     | 11.7363     | .992776        | 11.8217     | [.000]  |
| BGDP11    | 43.8391     | 6.44084        | 6.80643     | [.000]  |
| BGDP12    | -3.03242    | .443283        | -6.84083    | [.000]  |
| TN11      | .015862     | .647193E-02    | 2.45082     | [.014]  |

|   |
|---|
| <b>F2: competition on both sides, alternative ad demand</b> |
|---|

$$\Delta \log(S_{1t}) = \gamma_1 \Delta N_{1t}^a - \gamma_2 \Delta N_{2t}^a + \varphi_1 \Delta N_{1t}^c - \varphi_2 \Delta N_{2t}^c - \beta_1 \Delta p_{1t} + \beta_2 \Delta p_{2t}$$

$$\Delta \log(S_{2t}) = \gamma_1 \Delta N_{2t}^a - \gamma_2 \Delta N_{1t}^a + \varphi_1 \Delta N_{2t}^c - \varphi_2 \Delta N_{1t}^c - \beta_1 \Delta p_{2t} + \beta_2 \Delta p_{1t}$$

$$\Delta \log(N_{1t}^a) = -\kappa_1 \Delta \left( \frac{S_{1t}}{a_{1t}} \right) + \kappa_2 \Delta \left( \frac{S_{2t}}{a_{2t}} \right)$$

$$\Delta \log(N_{2t}^a) = -\kappa_1 \Delta \left( \frac{S_{2t}}{a_{2t}} \right) + \kappa_2 \Delta \left( \frac{S_{1t}}{a_{1t}} \right)$$

Test of overidentifying restrictions = 46.4398 [.992]  
 Number of observations = 91 E'PZ\*E = .510327

| Parameter | Estimate     | Standard Error | t-statistic | P-value |
|-----------|--------------|----------------|-------------|---------|
| GAMMA1    | .270656E-03  | .305806E-04    | 8.85058     | [.000]  |
| GAMMA2    | -.726902E-03 | .333462E-04    | -21.7987    | [.000]  |
| PSI1      | .919272E-04  | .115550E-04    | 7.95565     | [.000]  |
| PSI2      | -.258295E-04 | .130428E-04    | -1.98036    | [.048]  |
| BETA1     | .117266      | .018476        | 6.34701     | [.000]  |
| BETA2     | .082533      | .033921        | 2.43312     | [.015]  |
| BPOP11    | -158.757     | 18.8583        | -8.41842    | [.000]  |
| BPOP12    | 18.6243      | 2.21439        | 8.41057     | [.000]  |
| TS11      | -.579558E-02 | .237970E-02    | -2.43542    | [.015]  |
| KAPPA1    | 2.59105      | .363952        | 7.11922     | [.000]  |
| KAPPA2    | -13.0013     | .500687        | -25.9669    | [.000]  |
| BGDP11    | 58.7104      | 3.44941        | 17.0204     | [.000]  |
| BGDP12    | -4.05580     | .237300        | -17.0914    | [.000]  |
| TN11      | .015477      | .247622E-02    | 6.25028     | [.000]  |

|   |
|---|
| <b>F4: competitive bottleneck model, all restrictions imposed</b> |
|---|

$$\Delta \log(S_{1t}) = \gamma_1 \Delta N_{1t}^a - \gamma_1 \Delta N_{2t}^a + \varphi_1 \Delta N_{1t}^c - \varphi_1 \Delta N_{2t}^c - \beta_1 \Delta p_{1t} + \beta_1 \Delta p_{2t}$$

$$\Delta \log(S_{2t}) = \gamma_1 \Delta N_{2t}^a - \gamma_1 \Delta N_{1t}^a + \varphi_1 \Delta N_{2t}^c - \varphi_1 \Delta N_{1t}^c - \beta_1 \Delta p_{2t} + \beta_1 \Delta p_{1t}$$

$$\Delta \log(N_{1t}^a) = -\kappa_1 \Delta \left( \frac{S_{1t}}{a_{1t}} \right)$$

$$\Delta \log(N_{2t}^a) = -\kappa_1 \Delta \left( \frac{S_{2t}}{a_{2t}} \right)$$

Test of overidentifying restrictions = 45.1798 [.991]  
 Number of observations = 91 E'PZ\*E = .496482

| Parameter | Estimate    | Standard Error | t-statistic | P-value |
|-----------|-------------|----------------|-------------|---------|
| GAMMA1    | .658356E-03 | .311145E-04    | 21.1592     | [.000]  |
| PSI1      | .305084E-05 | .103638E-04    | .294375     | [.768]  |
| BETA1     | .014828     | .022625        | .655351     | [.512]  |
| BPOP11    | -116.010    | 22.1016        | -5.24893    | [.000]  |
| BPOP12    | 13.6193     | 2.59525        | 5.24777     | [.000]  |
| TS11      | .010209     | .207869E-02    | 4.91140     | [.000]  |
| KAPPA1    | 8.92334     | .467453        | 19.0893     | [.000]  |
| BGDP11    | 35.5943     | 3.93357        | 9.04883     | [.000]  |
| BGDP12    | -2.53622    | .273649        | -9.26815    | [.000]  |
| TN11      | .038493     | .435592E-02    | 8.83692     | [.000]  |

**F5: competitive bottleneck model, test for monopoly on ad market**

$$\Delta \log(S_{1t}) = \gamma_1 \Delta N_{1t}^a - \gamma_1 \Delta N_{2t}^a + \varphi_1 \Delta N_{1t}^c - \varphi_1 \Delta N_{2t}^c - \beta_1 \Delta p_{1t} + \beta_1 \Delta p_{2t}$$

$$\Delta \log(S_{2t}) = \gamma_1 \Delta N_{2t}^a - \gamma_1 \Delta N_{1t}^a + \varphi_1 \Delta N_{2t}^c - \varphi_1 \Delta N_{1t}^c - \beta_1 \Delta p_{2t} + \beta_1 \Delta p_{1t}$$

$$\Delta \log(N_{1t}^a) = -\kappa_1 \Delta \left( \frac{S_{1t}}{a_{1t}} \right) + \kappa_2 \Delta \left( \frac{S_{2t}}{a_{2t}} \right)$$

$$\Delta \log(N_{2t}^a) = -\kappa_1 \Delta \left( \frac{S_{2t}}{a_{2t}} \right) + \kappa_2 \Delta \left( \frac{S_{1t}}{a_{1t}} \right)$$

Test of overidentifying restrictions = 48.0239 [.995]  
 Number of observations = 91 E'PZ\*E = .527735

| Parameter | Estimate     | Standard Error | t-statistic | P-value |
|-----------|--------------|----------------|-------------|---------|
| GAMMA1    | .827999E-03  | .199460E-04    | 41.5120     | [.000]  |
| PSI1      | -.168642E-04 | .129108E-04    | -1.30621    | [.191]  |
| BETA1     | -.097495     | .022523        | -4.32875    | [.000]  |
| BPOP11    | -150.768     | 13.7258        | -10.9843    | [.000]  |
| BPOP12    | 17.7112      | 1.61236        | 10.9846     | [.000]  |
| TS11      | .513521E-02  | .153376E-02    | 3.34812     | [.001]  |
| KAPPA1    | 2.65075      | .277249        | 9.56087     | [.000]  |
| KAPPA2    | 13.7414      | .317075        | 43.3381     | [.000]  |
| BGDP11    | 34.9684      | 2.86948        | 12.1863     | [.000]  |
| BGDP12    | -2.51038     | .199422        | -12.5883    | [.000]  |
| TN11      | .044873      | .223497E-02    | 20.0779     | [.000]  |