**The effects on the Australian economy of an expansion in the electronic publishing industry: results from the MONASH model**

**by**

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We present MONASH results for three simulations involving expansion of electronic publishing in Australia.

Simulation 1. Electronic publishing sales in Australia by Australian providers increase by $39.5 million over the next 5 years. We assume that this is an increase of 280 per cent (from about 1.7 per cent of publishing sales to 6.5 per cent). There is no crowding out of existing sales of published material.

Simulation 2. Same as Simulation 1 except that export sales of electronic publishing increase from zero to $2.7 million over 5 years.

Simulation 3. Same as Simulation 1 except that electronic publishing crowds out existing sales of published material.

In each simulation we assume that the expansion in electronic publishing arises from changes in copyright laws that facilitate revenue collection by providers of electronic publications.

The main results from our three simulations are shown in Charts 1a and 1b or equivalently in the consumption sections of Tables 1a and 1b.

In Simulation 1, the expansion in electronic publishing leads to an eventual increase in real private consumption of about $62 million a year. We have set up the simulations so that the increase in real private consumption can be interpreted as the increase in economic welfare. To do this we assume in the simulations that the government does not change its own real expenditure as a result of the shock (the expansion in electronic publishing) and at the same time it adjusts consumption taxes to prevent the shock from affecting real national saving. Our saving assumption is close to assuming that the government runs a balanced budget.

In Simulation 2, the long-run welfare effect (the increase in real private consumption) is slightly higher than in Simulation 1, $63.19m compared with $61.82m. In Simulation 3, the long-run welfare effect is lower than in the other simulations, about $45m rather than about $60m.

At first glance it may seem surprising that an expansion in sales of electronic publishing of only $39.5m can generate welfare gains of between $45m and $60m. We assume that electronic publishing in Australia is currently inhibited by weaknesses in copyright laws, weaknesses that limit the ability of the industry to collect revenue for their products. From the point of view of economic welfare, this is equivalent to a situation in which demand for and hence output of electronic publishing is inhibited by a very high sales tax. We assume that the expansion in electronic publishing that would follow from improvements in copyright laws (enabling the industry to collect revenue for its electronic products) has welfare effects that are similar to those that would follow from a reduction in a very high sales tax. Thus we find that an expansion in electronic publishing would be accompanied by a gain in consumer surplus. This is the source of the high welfare gains shown in our simulations, and is illustrated in Figure 1.

In Figure 1, the demand curve for electronic publishing is DD. The initial quantity of electronic publishing is $Q_I$. This is produced at a fixed marginal cost of MC. Supply is limited to $Q_I$ by problems in revenue collection. Consumer demand, which must also be limited to $Q_I$, is

determined as if there is a sales tax of $P_I$ – MC per unit. Alternatively, there may be pure profits of $P_I$ – MC per unit. With changes in copyright regulations we assume that output can expand to $Q_F$. Thus the change in copyright regulations is equivalent to a reduction in the tax from $P_I$ – MC to $P_F$ – MC. Alternatively, we may think of the change in copyright regulations as generating competitive pressures that reduce pure profits per unit from $P_I$ – MC to $P_F$ – MC. In either case there is a gain in consumer surplus in excess of resource costs to the economy. This is measured by the area ABCEF. As can be seen from the figure, area ABCEF can be quite large (e.g. $60m) relative to area $Q_IBEQ_F$, the value of extra sales (e.g. $39.5m).

Now we consider some details of Figure 1. In all three simulations we assume, without loss of generality, that $P_F$, the final selling price of electronic publishing, is $1. We assume that $Q_F$ is 3.8*$Q_I$. With the new sales being worth $39.5m, $Q_I$ and $Q_F$ can now be determined as 14.11m and 53.61m. We assume that MC = $0.3541. This was derived taking account of advice, from our colleagues at Allen Consulting, suggesting that:

(1) a dollar's worth of electronic publishing output can be produced by resources in the publishing industry worth $0.35; and

(2) expansion of electronic publishing will require administration set-up costs of $400,000, equivalent to about $20,000 per year, plus ongoing collection costs of $200,000 a year.

Together, (1) and (2) give costs per dollar of sales in electronic publishing of $0.3541 (= 0.35+0.22/53.61).

In Simulation 1, we assume that the elasticity of demand for electronic publishing (the elasticity of the DD curve) is -1. In choosing this elasticity value, we assumed that electronic publishing is not a particularly good substitute for any other commodity. In particular, we assume that it is quite distinct from other publishing products. With this elasticity assumption, the equation for DD is

$$Q = 53.61 * P^{-1}$$

or equivalently,

$$P = 53.61 * Q^{-1}$$

From here we would expect the welfare gain to be determined as

$$\text{area ABCEF} = \int_{14.11}^{53.61} \frac{53.61}{Q} dQ \quad - \quad [0.3541 * (53.61 - 14.11)]$$

$$= \$57.6\text{m}$$

This is close to the MONASH result of about $62m. It is apparent that the general equilibrium effects taken into account in large scale models such as MONASH contribute very little to our result.

In Simulation 2, we continue to assume that the elasticity of demand for electronic publishing is -1 and that the expansion in domestic sales of electronic publishing is the same as that in simulation 1. In addition to the expansion of domestic sales, we assume that there is an expansion in export sales of $2.7m. With marginal costs being only 35.41 per cent of price, we would expect an expansion of export sales of $2.7m to generate a welfare gain of about $1.7m [= 2.7*(1-.3541)]. This is reasonably close to the MONASH result: as can be seen from our consumption results in Table 1b, MONASH shows an additional long-run welfare gain as we go from Simulation 1 to Simulation 2 of about $1.4m.

In Simulation 3, we assume that electronic publishing is a good substitute for traditional publishing products. Thus we adopt a higher demand elasticity for electronic products than in the earlier simulations, -2 instead of -1. We also introduce a contraction in demand for traditional

publishing products. However the contraction is not important in determining the welfare result. What is important is the larger elasticity. In terms of Figure 1, this means a flatter DD curve and, consequently, a smaller gain in consumer surplus. With a demand elasticity of -2, the equation for DD is

$$Q = 53.61 * P^{-2}$$

and we would expect the welfare gain to be determined as

$$\text{area ABCEF} = \int_{14.11}^{53.61} \left( \frac{53.61}{Q} \right)^{1/2} dQ \quad - \quad \left[ 0.3541 * (53.61 - 14.11) \right] = \$38.2\text{m} .$$

This is close to the MONASH result of $44.7m.

Apart from the effects on aggregate welfare, the other macroeconomic results generated by MONASH for an expansion in electronic publishing are of comparatively little interest. The percentage increases in GDP is similar to that in consumption, and the percentage changes in exports, imports and investment are negligible (see Tables 1a and 1b).

In all three simulations we assumed that expansion in electronic publishing has no effect on aggregate employment. We assume that wage rates change throughout the economy to neutralise employment effects. This is a conventional long-run assumption, but may be too pessimistic for the short run. As can be seen in Table 1a, expansion of electronic publishing allows small increases in wage rates at the given level of aggregate employment. If we had allowed for some stickiness in wage responses, then our simulations would have generated short-run increases in aggregate employment and even greater short-run welfare gains than those shown in this paper. The long-run results would have been unaffected.

Table 2 shows the long-run effects (effects in 2011) in the three simulations of expansion of electronic publishing on employment by industry. Consistent with our assumption on aggregate employment, the three column sums in Table 2 are zero. In each simulation there are between 209 and 227 jobs created in electronic publishing (industry 33). The expansion of electronic publishing causes a switch in consumer spending away from other products generating small negative effects on employment in nearly all other industries. In simulation 3, where we assume that electronic publishing crowds out traditional publishing, these negative effects are concentrated in industry 47, newspapers and books, which includes traditional publishing. Simulation 3 also shows a comparatively large reduction in employment in retail trade (industry 90). This is because the selling of newspapers and books requires a considerable input of retail trade services whereas electronic publishing doesn't.

***Figure 1. Consumer surplus and demand for electronic publishing (Simulation 1)***

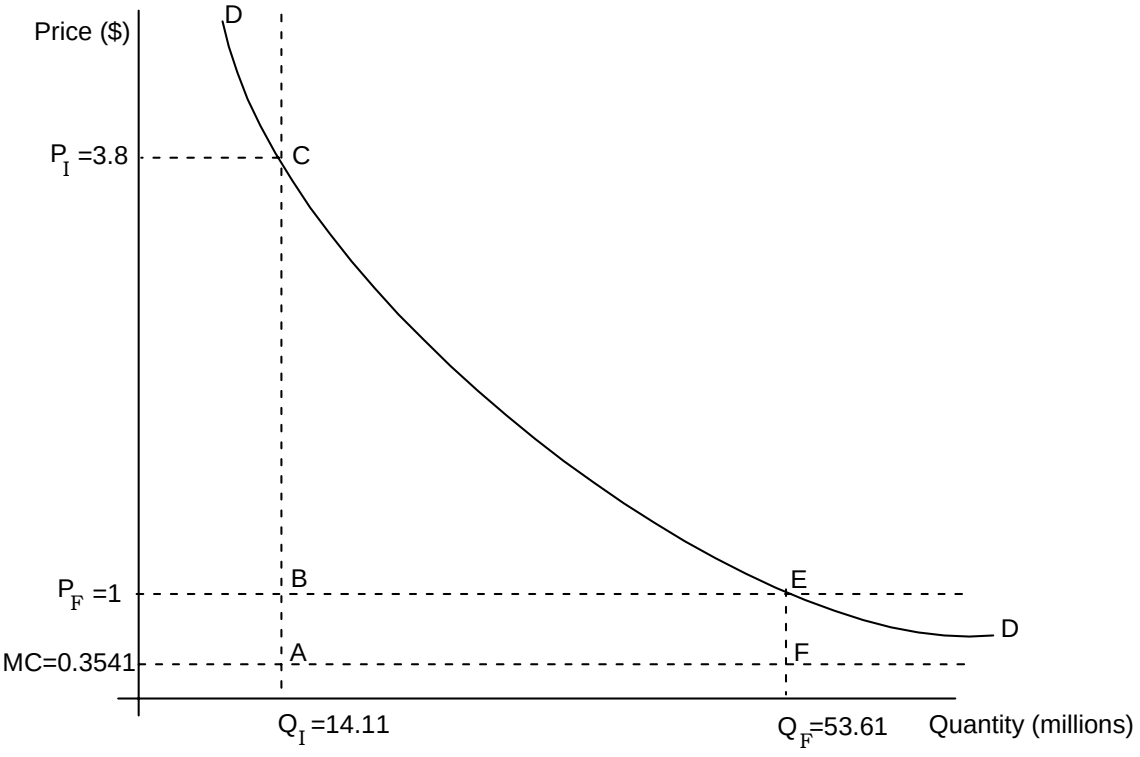

***Chart 1a. Effects of copyright reform on private consumption and welfare (percentage deviations from basecase forecast)***

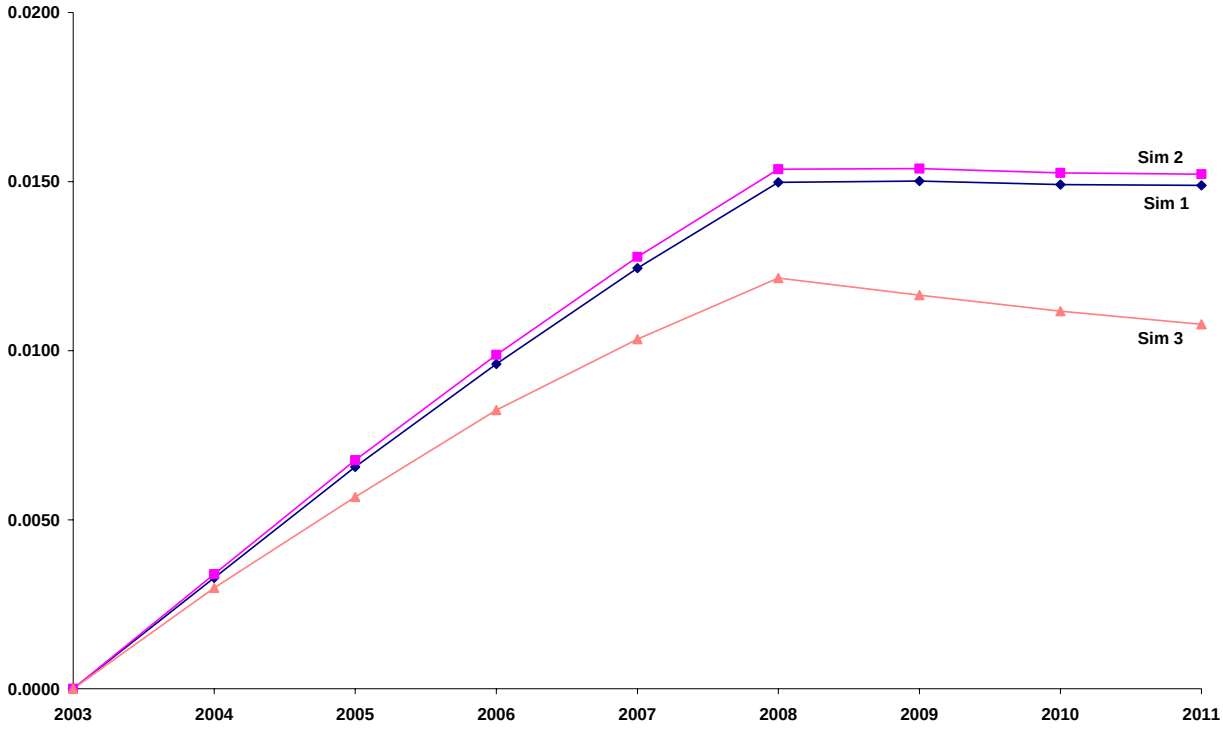


***Chart 1b. Effects of copyright reform on private consumption and welfare ($million deviations from basecase forecast)***

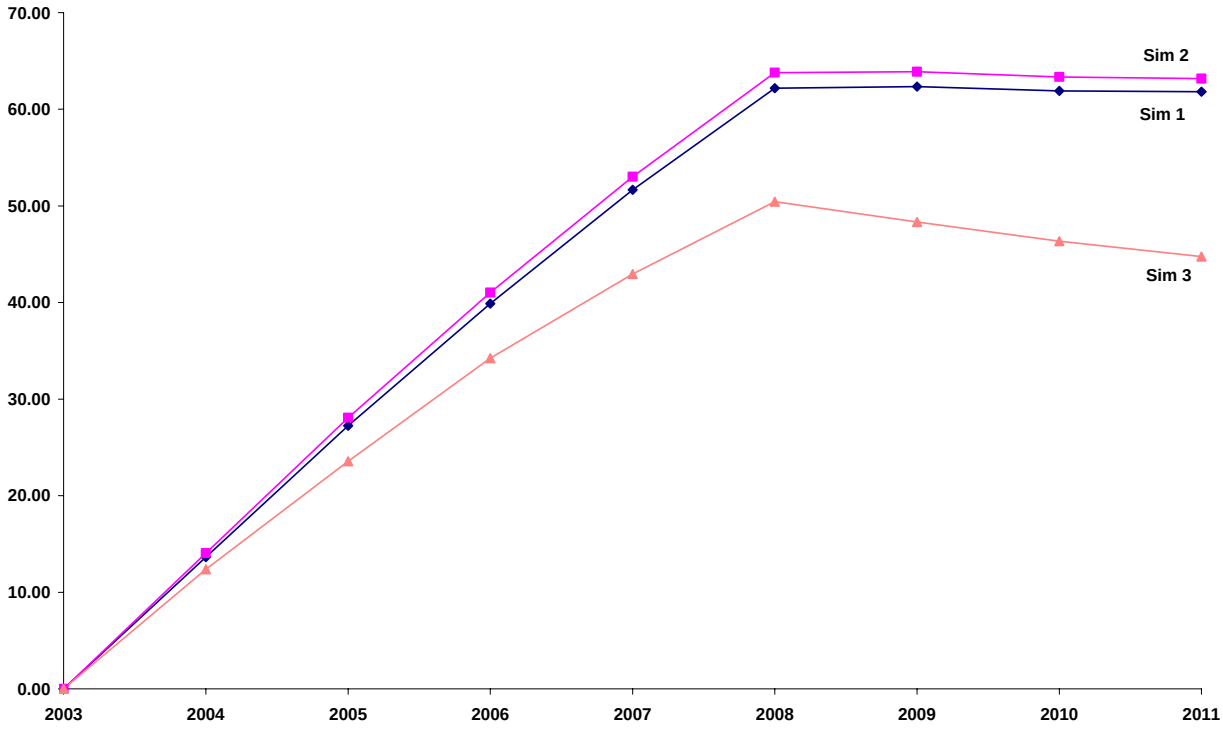

***Table 1a. Percentage effects of expansion in electronic publishing***

| values in 2003 | | Percentage deviations in real magnitudes | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 |
| Consumption | Sim 1 | 0 | 0.0033 | 0.0066 | 0.0096 | 0.0124 | 0.0150 | 0.0150 | 0.0149 | 0.0149 |
| $415.2b | Sim 2 | 0 | 0.0034 | 0.0068 | 0.0099 | 0.0128 | 0.0154 | 0.0154 | 0.0153 | 0.0152 |
| | Sim 3 | 0 | 0.0030 | 0.0057 | 0.0082 | 0.0103 | 0.0121 | 0.0116 | 0.0112 | 0.0108 |
| GDP | Sim 1 | 0 | 0.0021 | 0.0041 | 0.0060 | 0.0076 | 0.0091 | 0.0089 | 0.0088 | 0.0088 |
| $646.6b | Sim 2 | 0 | 0.0022 | 0.0042 | 0.0061 | 0.0078 | 0.0093 | 0.0091 | 0.0090 | 0.0089 |
| | Sim 3 | 0 | 0.0017 | 0.0032 | 0.0048 | 0.0060 | 0.0071 | 0.0069 | 0.0067 | 0.0066 |
| Exports | Sim 1 | 0 | 0.0003 | 0.0000 | -0.0002 | -0.0004 | -0.0008 | -0.0018 | -0.0022 | -0.0027 |
| $142.9b | Sim 2 | 0 | 0.0002 | -0.0002 | -0.0005 | -0.0007 | -0.0011 | -0.0022 | -0.0025 | -0.0030 |
| | Sim 3 | 0 | -0.0027 | -0.0044 | -0.0054 | -0.0060 | -0.0063 | -0.0053 | -0.0044 | -0.0037 |
| Imports | Sim 1 | 0 | -0.0004 | -0.0009 | -0.0015 | -0.0023 | -0.0033 | -0.0031 | -0.0031 | -0.0031 |
| $169.3b | Sim 2 | 0 | -0.0004 | -0.0009 | -0.0016 | -0.0024 | -0.0034 | -0.0033 | -0.0033 | -0.0032 |
| | Sim 3 | 0 | -0.0002 | -0.0005 | -0.0009 | -0.0014 | -0.0020 | -0.0020 | -0.0020 | -0.0020 |
| Investment | Sim 1 | 0 | -0.0008 | -0.0017 | -0.0028 | -0.0042 | -0.0060 | -0.0053 | -0.0050 | -0.0046 |
| $137.8b | Sim 2 | 0 | -0.0008 | -0.0016 | -0.0027 | -0.0041 | -0.0059 | -0.0052 | -0.0049 | -0.0046 |
| | Sim 3 | 0 | 0.0015 | 0.0023 | 0.0026 | 0.0025 | 0.0020 | 0.0014 | 0.0008 | 0.0003 |
| Real wage | Sim 1 | 0 | 0.0037 | 0.0076 | 0.0114 | 0.0153 | 0.0191 | 0.0188 | 0.0185 | 0.0183 |
| rate | Sim 2 | 0 | 0.0038 | 0.0076 | 0.0115 | 0.0154 | 0.0192 | 0.0189 | 0.0186 | 0.0184 |
| | Sim 3 | 0 | 0.0018 | 0.0037 | 0.0057 | 0.0078 | 0.0100 | 0.0096 | 0.0093 | 0.0091 |

***Table 1b. Dollar effects of expansion in electronic publishing***

| values in 2003 | | deviations in millions of 2003 dollars | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 |
| Consumption | Sim 1 | 0 | 13.63 | 27.24 | 39.89 | 51.66 | 62.18 | 62.34 | 61.90 | 61.82 |
| $415.2b | Sim 2 | 0 | 14.07 | 28.08 | 41.02 | 53.03 | 63.80 | 63.88 | 63.35 | 63.19 |
| | Sim 3 | 0 | 12.38 | 23.56 | 34.23 | 42.94 | 50.44 | 48.34 | 46.36 | 44.75 |
| GDP | Sim 1 | 0 | 13.68 | 26.57 | 38.54 | 49.35 | 58.73 | 57.85 | 57.16 | 56.59 |
| $646.6b | Sim 2 | 0 | 14.06 | 27.26 | 39.49 | 50.49 | 60.05 | 59.11 | 58.36 | 57.73 |
| | Sim 3 | 0 | 11.22 | 21.78 | 31.99 | 40.60 | 48.09 | 46.90 | 45.83 | 44.83 |
| Exports | Sim 1 | 0 | 0.40 | -0.04 | -0.26 | -0.59 | -1.10 | -2.64 | -3.15 | -3.84 |
| $142.9b | Sim 2 | 0 | 0.23 | -0.35 | -0.66 | -1.06 | -1.63 | -3.11 | -3.61 | -4.25 |
| | Sim 3 | 0 | -3.80 | -6.30 | -7.78 | -8.61 | -9.00 | -7.61 | -6.28 | -5.32 |
| Imports | Sim 1 | 0 | -0.71 | -1.47 | -2.53 | -3.86 | -5.50 | -5.33 | -5.26 | -5.17 |
| $169.3b | Sim 2 | 0 | -0.75 | -1.55 | -2.66 | -4.04 | -5.75 | -5.59 | -5.54 | -5.46 |
| | Sim 3 | 0 | -0.31 | -0.79 | -1.56 | -2.42 | -3.42 | -3.37 | -3.37 | -3.36 |
| Investment | Sim 1 | 0 | -1.15 | -2.28 | -3.81 | -5.75 | -8.20 | -7.29 | -6.84 | -6.32 |
| $137.8b | Sim 2 | 0 | -1.09 | -2.18 | -3.68 | -5.62 | -8.08 | -7.19 | -6.77 | -6.28 |
| | Sim 3 | 0 | 2.03 | 3.24 | 3.57 | 3.45 | 2.76 | 1.98 | 1.15 | 0.42 |

***Table 2. Employment effects in 2011 of expansion in electronic publishing (jobs)***

| | Simulation 1 | Simulation 2 | Simulation 3 |
|---|---|---|---|
| 1 I1Pastoral | -0.65 | -0.74 | 0.06 |
| 2 I2WheatSheep | -1.55 | -1.95 | 0.77 |
| 3 I3HighRain | -1.38 | -1.60 | 0.66 |
| 4 I4NthBeef | -0.32 | -0.37 | 0.31 |
| 5 I5MilkCattle | -0.84 | -1.27 | 2.11 |
| 6 I6OthExport | -0.48 | -0.81 | 0.08 |
| 7 I7ImportComp | -1.07 | -1.50 | 1.66 |
| 8 I8Poultry | -0.13 | -0.14 | 0.41 |
| 9 I9AgServ | -0.32 | -0.54 | 0.24 |
| 10 I10Forestry | -0.37 | -0.46 | -1.25 |
| 11 I11Fishing | -0.27 | -0.28 | 0.46 |
| 12 I12IronOre | -0.13 | -0.15 | -0.14 |
| 13 I13NFerrous | -0.45 | -0.55 | -0.47 |
| 14 I14BlkCoal | -1.39 | -1.56 | -1.23 |
| 15 I15OilGas | -0.23 | -0.26 | 0.11 |
| 16 I16OthMin | -0.86 | -1.23 | -0.43 |
| 17 I17MinServ | -0.08 | -0.12 | -0.07 |
| 18 I18Meat | -1.68 | -1.81 | 2.42 |
| 19 I19Dairy | -0.18 | -0.34 | 0.69 |
| 20 I20FrtVeg | -0.14 | -0.16 | 0.63 |
| 21 I21OilFat | -0.04 | -0.07 | -0.03 |
| 22 I22Flour | -0.74 | -1.26 | -0.04 |
| 23 I23Bakery | -0.15 | -0.18 | 1.98 |
| 24 I24Confect | -0.16 | -0.25 | 0.20 |
| 25 I25Sea_Sugar | -0.47 | -0.51 | 1.16 |
| 26 I26SoftDr | -0.16 | -0.15 | 0.98 |
| 27 I27Beer | -0.17 | -0.16 | 0.59 |
| 28 I28OthDrink | -0.55 | -0.76 | 0.10 |
| 29 I29Tobacco | -0.06 | -0.07 | 0.24 |
| 30 I30Ginning | -0.01 | -0.03 | -0.02 |
| 31 I31Synthetic | -0.21 | -0.28 | -0.06 |
| 32 I32Yarn | -0.19 | -0.29 | 0.14 |
| 33 Electronic publishing | 213.38 | 226.78 | 209.01 |
| 34 I34TextileF | -0.05 | -0.07 | 0.08 |
| 35 I35Carpets | -0.07 | -0.08 | 0.02 |
| 36 I36Canvas | -0.12 | -0.16 | -0.01 |
| 37 I37Knitting | -0.08 | -0.13 | 0.11 |
| 38 I38Clothing | -0.41 | -0.56 | 1.18 |
| 39 I39Footwear | -0.15 | -0.20 | 0.11 |
| 40 I40Sawmill | -1.07 | -1.05 | 0.84 |
| 41 I41Panels | -0.44 | -0.50 | 0.38 |
| 42 I42Fittings | -1.29 | -1.21 | 1.48 |
| 43 I43Furniture | -1.26 | -1.32 | 0.99 |
| 44 I44PulpPaper | -0.31 | -0.36 | -4.33 |
| 45 I45BagsBoxes | -0.27 | -0.31 | -0.32 |
| 46 I46Sanitary | -0.06 | -0.06 | 0.23 |
| 47 I47NewsBooks | -0.47 | -0.51 | -115.00 |
| 48 I48CommPrint | -2.06 | -2.24 | -6.19 |
| 49 I49Fertilisr | -0.02 | -0.03 | -0.01 |
| 50 I50BasicChem | -1.20 | -1.68 | -0.62 |
| 51 I51Paints | -0.31 | -0.35 | 0.22 |
| 52 I52Pharmacy | -0.86 | -1.01 | 0.57 |
| 53 I53Soaps | -0.09 | -0.12 | 0.16 |
| 54 I54Cosmetics | -0.06 | -0.08 | 0.14 |
| 55 I55Explosive | -0.47 | -0.60 | -0.54 |
| 56 I56Petrol | -0.29 | -0.33 | -0.01 |
| 57 I57Glass | -0.34 | -0.41 | 0.26 |
| 58 I58ClayProd | -0.88 | -0.88 | 0.95 |
| 59 I59Cement | -0.20 | -0.20 | 0.13 |
| 60 I60Readymix | -0.25 | -0.23 | 0.24 |

| | | | |
|---|---|---|---|
| 61 I61Pipes | -0.55 | -0.53 | 0.48 |
| 62 I62Plaster | -0.51 | -0.51 | 0.43 |
| 63 I63IronSteel | -1.10 | -1.54 | -0.29 |
| 64 I64NFerrous | 1.55 | 1.08 | -0.37 |
| 65 I65Structurl | -1.28 | -1.38 | 0.48 |
| 66 I66SheetMetl | -1.19 | -1.95 | -0.60 |
| 67 I67Wire | -2.08 | -2.58 | -0.76 |
| 68 I68MotorVeh | -2.45 | -2.90 | -0.74 |
| 69 I69Ships | -0.26 | -0.44 | -0.26 |
| 70 I70Trains | -0.02 | -0.03 | 0.00 |
| 71 I71Aircraft | -0.33 | -0.46 | -0.15 |
| 72 I72SciEquip | -0.11 | -0.15 | 0.11 |
| 73 I73Electron | -1.97 | -2.82 | -1.29 |
| 74 I74HousAppl | -0.35 | -0.36 | 0.30 |
| 75 I75ElectEq | -0.32 | -0.47 | -0.21 |
| 76 I76AgMach | -0.05 | -0.10 | -0.05 |
| 77 I77ConMach | -0.07 | -0.15 | -0.10 |
| 78 I78ManuMach | -1.70 | -2.57 | -1.94 |
| 79 I79Leather | -0.51 | -0.98 | -0.60 |
| 80 I80Rubber | -0.35 | -0.42 | -0.24 |
| 81 I81Plastic | -1.24 | -1.54 | -0.03 |
| 82 I82Signs | -0.16 | -0.17 | -0.29 |
| 83 I83SportEq | -0.33 | -0.59 | -0.31 |
| 84 I84Electrcty | -2.18 | -2.49 | 0.59 |
| 85 I85Gas | -0.28 | -0.29 | 0.15 |
| 86 I86Water | -1.26 | -1.24 | 0.64 |
| 87 I87Resident | -17.50 | -15.76 | 25.48 |
| 88 I88OthBuild | -11.90 | -12.63 | -7.08 |
| 89 I89Wholesale | -20.59 | -25.01 | -49.04 |
| 90 I90RetailTrd | -20.46 | -17.52 | -121.35 |
| 91 I91MechRep | -2.61 | -2.50 | 2.82 |
| 92 I92OthRepair | -0.91 | -0.92 | -0.90 |
| 93 I93RoadTrans | -9.95 | -11.49 | -19.60 |
| 94 I94RailTrans | -0.73 | -0.86 | 0.23 |
| 95 I95WaterTran | -0.06 | -0.08 | -0.18 |
| 96 I96AirTransp | -3.33 | -3.34 | -0.02 |
| 97 I97TransServ | -2.81 | -2.94 | -1.24 |
| 98 I98Communic | -8.80 | -8.80 | -7.36 |
| 99 I99Banking | -5.90 | -5.91 | 0.78 |
| 100 I100NonBank | -1.44 | -1.51 | -0.90 |
| 101 I101Investm | -1.93 | -2.03 | -1.37 |
| 102 I102Insurnce | -4.11 | -3.93 | 3.45 |
| 103 I103OthFinan | -10.26 | -11.17 | -13.56 |
| 104 I104Dwelling | 0.00 | 0.00 | 0.00 |
| 105 I105PubAdmin | 2.32 | 2.44 | -0.56 |
| 106 I106Defence | 0.77 | 0.69 | 0.75 |
| 107 I107Health | -14.56 | -12.44 | 38.67 |
| 108 I108Educate | -13.14 | -14.20 | 29.85 |
| 109 I109Welfare | -1.02 | -0.68 | 10.18 |
| 110 I110Entrtain | -5.59 | -5.13 | 4.52 |
| 111 I111Hotels | -8.85 | -8.77 | 5.47 |
| 112 I112PerServ | -2.39 | -2.21 | 3.67 |
| 113 I113Other | 0.00 | 0.00 | 0.00 |
| Total | 0.00 | 0.00 | 0.00 |