

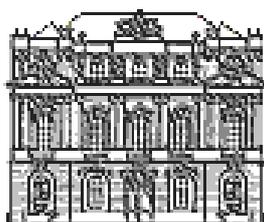
# ICE - WORKING PAPER

B2C ECOMMERCE: A FRICTIONLESS MARKET IS NOT IN SIGHT –  
ARGUMENTS AND POLICY IMPLICATIONS

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## **Introduction**

The formation of the „e-Society“ incorporates interdependent changes of the societal communications system, the economic system, and the role and policies of nation states. The outcome of these changes is characterised by a transformed societal communications system – Mediamatics (MEDIA, inforMATICS) –, a transformed economic system – Digital Economy –, and a transformed statism (changing polity, policy and politics) – Mediamatics Policy.<sup>1</sup>

eCommerce takes advantage of a perfect example and central driving force of the convergent mediamatics system, the Internet. It represents industrial economic characteristics of the Digital Economy and asks for a transformed statism in order to create a favourable policy framework for its development.

In our paper we discuss the widely held view that B2C eCommerce markets are or at least tend to be frictionless, approaching the ideal-type frictionless market in microeconomic theory. The social consequences would be numerous, affecting the impact on consumers and on respective state policies. We provide arguments for and against the assumption of a frictionless, highly competitive B2C eCommerce market and discuss policy conclusions based on this analysis.<sup>2</sup>

## **Arguments for a Frictionless eCommerce Market**

*“One of the major features of the Internet revolution is its potential to make the whole economic system, nationally and internationally, more competitive by bringing markets closer to the economists’ textbook model of perfect competition, characterized by large numbers of buyers and sellers bidding in a market with perfect information.” (Litan/Rivlin 2001, 315).*

*“Lower search costs in digital markets will make it easier for buyers to find low-cost sellers, and thus will promote price competition among sellers.” (Bakos 2001, 71).*

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<sup>1</sup> For a detailed analysis of the mediamatics system and mediamatics policy see Latzer 1998, 2000.

<sup>2</sup> We can only highlight and summarize the major arguments due to restrictions in the length of this paper. For a more detailed discussion of the intensity of competition in B2C eCommerce and further evidence see Latzer/Schmitz 2001, Schmitz/Latzer 2001.

The widely held view that B2C eCommerce markets are, or at least tend to be frictionless, rests upon the following arguments in essence:

- The abundance of information results in low search and information costs, so that prices can be compared at virtually no cost.
- Transaction costs are low and market transparency is high, as the goods sold in B2C eCommerce are essentially homogenous. The rising use of search engines and electronic price comparisons further decreases transaction costs and increases market transparency.
- High transparency of B2C eCommerce markets leads to a high intensity of competition and high contestability of B2C eCommerce markets<sup>3</sup>: Technological barriers to entry are low; access to production and distribution capacities is fast and inexpensive; possibilities of “boundary crossing” for large companies are high.

We classify these arguments as widely technology centred, as they are based on options provided by internet technology, but fail duly to account for industrial economic considerations, changing business strategies and empirical evidence.

## **Arguments Against a Frictionless B2C eCommerce Market**

In the following we present a list of arguments against a frictionless B2C eCommerce market: Heterogeneity of composite goods, limited market transparency, endogenous sunk costs, network effects, increasing returns to scale and positive feedback-loops. Further we argue that some *business strategies* limit the intensity of competition in B2C eCommerce: Price discrimination, lock-in effects and bundling. Even though arguments for a frictionless B2C eCommerce market are not dismissed, we argue that those against a frictionless market eventually prevail.

### **Heterogeneity of composite goods and asymmetric information**

The conditions for a frictionless market – including homogeneity of goods offered by a large number of sellers who are price takers, fully informed buyers – are no reasonable assumptions in the analysis of B2C eCommerce markets.<sup>4</sup>

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<sup>3</sup> See Mai/Oelmann 2001.

<sup>4</sup> For a general discussion of imperfect information in the product market see Stiglitz 1990.

The utility derived from the purchase in B2C eCommerce depends on the quality attributes of the *composite good*, consisting of the product (e.g. book, CD) and of various complementary goods (e.g. consumer and privacy protection, transparency of information, delivery service, payment procedure). While quality attributes of a particular book and CD can be assumed to be homogenous across B2C eCommerce companies, there is considerable heterogeneity with respect to the quality attributes of the complementary goods.<sup>5</sup> They are often experience goods. Hence, asymmetric information prevails in the B2C eCommerce market.<sup>6</sup> A first time purchase at a hitherto unknown online-store can be interpreted as an investment under uncertainty. A positive shopping experience with regard to the price/quality ratio of the composite good will reduce the inclination of an individual to risk the investment of a first time purchase at another store, unless the expected price/quality differential compensates at least for the additional uncertainty involved at the margin.<sup>7</sup>

The options available to sellers of experience goods to (partly) overcome the related informational problems – advertising, certification, guarantees, previews, reviews, and reputation – affect market transparency, market structure and consumer behaviour.<sup>8</sup>

### **Market transparency**

Market transparency in B2C eCommerce markets is lower than widely assumed. We present evidence that the amount of information provided on the web is huge, while consumers' resources to handle it are limited. Online consumers respond to abundance of information by restricting their attention to a very limited fraction of online shops. B2C eCommerce companies respond with high marketing and advertising expenditures and face high customer acquisition costs.

The following examples provide evidence for lower than expected market transparency:

- Search engines cover only a small fraction of web-sites (0,03%)<sup>9</sup> and eCommerce companies have means to manipulate the perception of the search results.<sup>10</sup> Consequently,

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<sup>5</sup> See Borenstein/Saloner 2001, Lucking-Reiley et al. 2000, Smith/Bailey/Brynjolfsson 1999.

<sup>6</sup> See Bakos 1998, 2001.

<sup>7</sup> Rajgopal/Venkatachalam/Kotha (2000) find that positive online customer experience is viewed as sustainable comparative advantage by financial markets as revealed by market prices of eCommerce companies.

<sup>8</sup> Prices are above marginal costs in order to provide an incentive for the firm not to lose the marginal customer, hence the firm has market power. Consumers are skeptical to switch to new entrants (see Stiglitz 1990, 824).

<sup>9</sup> See Bergman 2000.

<sup>10</sup> See Lawrence/Gilles 1999 and Sullivan 2001.

web-traffic is highly concentrated among the top web-sites with the top 0.1% attracting one third of the total volume of web-site visits in the sample.<sup>11</sup>

- We analysed the distribution of page views among the top 100 B2C eCommerce sites.<sup>12</sup> About 50% of the total page views on the sites of the top 100 are concentrated on the sites of 11 companies, about 75% of the page views on the sites of 38 companies. Amazon.com holds a share of 21%, the shares of all other companies are below 5%, flattening out quickly from 4,7% to 0,6%. In these calculations we excluded auction sites, as they also cover C2C eCommerce. Nevertheless, the biggest auction site ebay.com would have a share of 35% among the top 100 eCommerce companies in the fourth quarter of 2000. Altogether, these data indicate a low market transparency, as users concentrate on a few leading online web shops when (window) shopping online.
- Although the number of eCommerce companies offering books, CDs and travel arrangements online is very large, consumers tend to search very few shopping-sites and the fraction of shoppers that stop their search after the first site visited is high.<sup>13</sup>
- In a consumer survey<sup>14</sup> conducted in January and February 2000 in Austria the most important criterion for consumer choice was the brand name of the B2C eCommerce company (very important/important for 49%), followed by the trade mark of the good under consideration (very important/important for 40%). Classical internet based sources of information were ranked on places 3 to 5: Search engines (very important/important for 33%), portals (very important/important for 31%), and recommendations on the internet (very important/important for 30%). Finally, also advertising and recommendations in traditional media (very important/important for 25%) had some influence on consumer choice.
- Further empirical studies confirm these findings: Often consumers do not shop at the lowest prices shopping-sites, branded retailers can charge a higher premium above the lowest price than unbranded ones.<sup>15</sup>

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<sup>11</sup> See Adamic/Huberman 1999. Their sample consists of 60.000 users and 120.000 web-sites.

<sup>12</sup> Data source: Alexa Research 2001.

<sup>13</sup> See Johnson et al. 2000.

<sup>14</sup> For details see Latzer/Schmitz 2000.

<sup>15</sup> See Brynjolfsson/Smith 2000b, Clay et al. 2000.

## **Endogenous sunk costs**

To some extent sunk costs associated with market entry in B2C eCommerce are lower than in conventional retail markets, as the demand for the inputs personnel and outlet space is lower in online than in offline retail operations. However, endogenous sunk costs seem to be high in B2C eCommerce, leading to barriers to entry and market concentration – opposed to the ideal of a frictionless market. The evidence presented above shows that brand names play a crucial role in B2C eCommerce so that marketing and advertising expenditures are expected to be high.<sup>16</sup> These endogenous sunk costs affect the market structure: The concentration ratio in markets characterised by sunk costs does not converge to zero as the market size grows.<sup>17</sup> By limiting the number of competitors and the intensity of competition in the market, even in the presence of free entry, the long run average prices can be sustained above marginal costs to recoup sunk costs.

Due to asymmetric information with respect to price/quality attributes and limited market transparency, in particular with respect to non-contractible characteristics of the composite goods, and due to the prominent role of reputation, marketing and advertising expenditures play a crucial role in B2C eCommerce. B2C eCommerce is characterised by network effects, increasing returns to scale and positive feedback loops. Since history matters in these markets<sup>18</sup>, marketing and advertising expenditures have a longer lasting impact on these industries. These endogenous sunk costs are barriers to entry, eventually prices have to be above marginal costs to recoup endogenous sunk costs, and the intensity of competition is lower than in the absence of endogenous sunk costs, *ceteris paribus*. Furthermore, even if the B2C eCommerce market expands, there exists a positive lower limit for the concentration ratio even under free entry.

## **Network effects, increasing returns to scale and positive feedback-loops**

The existence of network effects, increasing returns to scale, and positive feedback loops<sup>19</sup> implies that larger B2C eCommerce companies will either sell at lower prices or have larger margins which enable them to invest more in non-price competition or simply generate higher

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<sup>16</sup> Pure player in B2C eCommerce reported advertising and marketing costs of 76% of revenues in 1999 (Shop.org 1999). In the Austrian retail market SMEs spend less than 2% of revenues on marketing and advertising activities on average in the same year (Austrian Chamber of Commerce).

<sup>17</sup> See Sutton 1991.

<sup>18</sup> See Katz/Shapiro 1985, Shapiro/Varian 1999.

<sup>19</sup> See Shapiro/Varian 1999.

profits. Minimum efficient scale is higher in the presence of positive feedback-loops than in their absence so that the intensity of competition is likely to be lower.

B2C eCommerce is often interpreted as exhibiting network effects.<sup>20</sup> The literature on networks distinguishes between direct and indirect network effects.<sup>21</sup> Direct network effects arise as the marginal participant increases the value of the network for all other current and prospective participants as the number of individuals to communicate with increases. Direct network effects are mostly taken into account by network sponsors. Indirect network effects are the result of market interaction and, therefore, they are not considered externalities.

Increasing returns play a more prominent role due to the costs structure of inventory management, in procurement, distribution and reputation.<sup>22</sup>

### **Price Discrimination**

In a frictionless market the law of one price prevails – there is no price discrimination, which is a common business strategy in B2C eCommerce to raise the price above marginal costs and to decrease the intensity of competition. A number of studies<sup>23</sup> argue that price discrimination is the explanation for the larger than expected price dispersion in B2C eCommerce, because the informational prerequisites can be obtained more easily in B2C eCommerce than in the traditional retail market. The argument presupposes that B2C eCommerce companies are not pure price takers – i.e. they must have some market power – and that arbitrage is not possible between different segments of the market. The segmentation of the market is usually assumed to be achieved by product differentiation, as it is relatively inexpensive to produce multiple versions of a digital good.

Price discrimination affects the intensity of competition (*i*) by reducing the transparency of the market and (*ii*) by reducing the number of buyers and sellers in each segment relative to the non-segmented relevant market.

The diffusion of online price comparison sites and shopbots is assumed to increase the intensity of competition. But B2C eCommerce companies react to technological advances in order to preserve profits and decrease the intensity of competition: Since not all consumers

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<sup>20</sup> See Borenstein/Saloner 2001.

<sup>21</sup> See e.g. Katz/Shapiro 1985, Liebowitz/Margolis 1994, 1998.

<sup>22</sup> See Borenstein/Saloner 2001.

<sup>23</sup> See Baylis/Perloff 2001, Clay et al. 2000, Clemons/Hann/Hitt 2000, Clemons et al. 2001.

engage in a costly search, B2C eCommerce may randomise prices to increase revenues without losing all the price sensitive customers.<sup>24</sup> Shopbots may facilitate tacit collusion among B2C eCommerce companies.<sup>25</sup>

### **Lock-in Effects and Switching Costs**

Another business strategy that affects the intensity of competition in B2C eCommerce is the creation of lock-in effects and switching costs. They are the result of a previous investment that, if compatible with a current purchase, reduces the costs of (or increases the utility derived from) that purchase. The investment depreciates rapidly, if the consumer switches suppliers, unless the investment is perfectly compatible with the new supplier.

Marketing and advertising expenditures (incl. discounts) might be higher in B2C markets than in comparable offline markets in the early stages of market development. The existence of lock-in effects and switching costs makes current market shares more valuable in the future. Furthermore, the effects of marketing and advertising expenditure are longer lived when customers face switching costs. Once the market matures, companies charge higher prices in markets with switching costs than in markets without switching costs and companies with a larger market share charge higher prices than those with a smaller one.<sup>26</sup>

Lock-in effects in B2C eCommerce can be endogenous, i.e. strategic instruments of B2C eCommerce companies: E.g. loyalty programs and customisation. But they can also be consequential to the nature of the composite goods which is an experience good; to learn about its quality is an informational investment under uncertainty. The subjective switching costs are equal to the maximum insurance premium the consumer is willing to pay, to be guaranteed a composite good that provides (at least) the same level of utility to him.<sup>27</sup> In short, bundling purchases at a single online store reduce non-pecuniary and pecuniary (e.g. per item shipping costs) transaction costs associated with online shopping.<sup>28</sup>

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<sup>24</sup> See Varian 2001.

<sup>25</sup> See Varian 1999 and Kauffman/Wood 2001.

<sup>26</sup> See Klemperer 1995.

<sup>27</sup> See Klemperer 1995, 517. For empirical evidence of the significant role of lock-in effects and switching costs due to positive experience with the quality of composite goods see Brynjolfsson/Smith (2000b) and Chen/Hitt (2001). Johnson et al. (2000) find evidence for the role of cognitive switching costs in B2C eCommerce.

<sup>28</sup> Johnson et al. (2000) find evidence that a high fraction of B2C eCommerce customers is loyal to one book or CD shop only.

## **Bundling**

Bundling<sup>29</sup> is a business strategy in markets for information goods in general and in B2C eCommerce in particular which is considered to reduce the intensity of competition.<sup>30</sup> It is a strategy that focuses on the aggregation of large numbers of information goods so that the entire set (or bundle) of goods can be sold at a single price. The list of examples comprises online newspaper articles, music and software downloads, photographs and video clips.<sup>31</sup> In their model, Bakos/Brynjolfsson (1999a,b) show that:

- The seller of the larger bundle will always be willing to spend more for an additional good to add to the bundle. Thus the larger bundler will grow larger relative to the smaller one.
- In a slightly adapted model the bundler can attract more consumers, charge a higher price and achieve higher revenues from a single, specific good than the seller distributing the good's imperfect substitute on its own.
- A bundling strategy can make market entry unattractive for potential entrants, if their goods cannot be bundled.<sup>32</sup>

## **Empirical Results on Price Levels and Price Dispersion**

Many empirical studies concentrate on two criteria for market frictions: price levels and price dispersion. Empirical studies on price levels argue along the following lines: Assuming that marginal costs are at least as low in B2C eCommerce as in traditional retailing, prices would be lower in the frictionless B2C eCommerce market than in traditional retailing.

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<sup>29</sup> Bundling has similar effects as price discrimination. As compared to first degree price discrimination the bundling strategy reduces the number of different prices to a uniform price for all consumers, and greatly reduces the information requirements and transaction costs while maximising seller's profits. For a discussion of bundling in the context of price discrimination see Varian 1990, 626.

<sup>30</sup> See Bakos/Brynjolfsson (1999a,b). However, one has to bear in mind that the problem is structured as bundling versus selling all goods separately, i.e. mixed bundling is ruled out. Consequently, Bakos and Brynjolfsson cannot derive marginal conditions for the optimality of including an additional good in a bundle, or selling it separately.

<sup>31</sup> See Bakos et al. (2000) for different bundling strategies in the online brokerage market.

<sup>32</sup> See also Nalebuff 2000.

Table 1: Empirical studies on price comparisons between B2C eCommerce and the comparable offline market

Higher prices in B2C eCommerce	Inconclusive results	Lower prices in B2C eCommerce
Arbeiterkammer Wien (1999), Bailey (1998), Clay et al. (2000), Frank/Hepperle (2001), Goldman Sachs (1997) <sup>33</sup>	Repl/Huber (2001)	Bakos et al. (2000), Brynjolfsson/Smith (2000a), Friberg/Ganslandt/Sandström (2001), Lee (2000), Scott Morton/Zettelmeyer/Risso (2001)

The findings summarised in table 1 do not justify a clear cut rejection of the hypothesis of a frictionless B2C eCommerce market (assuming marginal costs at least as low in B2C eCommerce as in traditional retailing). Five of the studies present evidence of higher, and five of lower prices in B2C eCommerce than in the comparable offline market.

Empirical studies concentrating on price dispersion argue along the following lines: In a frictionless market the law of one price prevails – in practical circumstances the dispersion of prices tends to be very small.

Table 2: Empirical studies on price dispersion in B2C eCommerce

Large price dispersion in B2C eCommerce	Inconclusive results	Small price dispersion in B2C eCommerce
Bailey (1998), Baylis/Perloff (2001), Bakos et al. (2000), Brynjolfsson/Smith (2000a,b), Clay et al. (2000), Clay/Tay (2001), Clemons/Hann/Hitt (2000), Frank/Hepperle (2001)	Lee (2000)	

Note: There is no clear cut-off point to classify price dispersion as large or low in the literature. We base our classification on the judgement of the authors as expressed in the papers cited.

Of the ten studies included in table 2, nine report findings of a large price dispersion in B2C eCommerce and only one yields inconclusive results. Consequently, the hypothesis that B2C eCommerce markets approach the ideal of a frictionless market has to be rejected.

Nevertheless, the empirical results have to be interpreted with care. (1) The “disequilibrium critique” stresses that the hypothesis of lower prices in B2C eCommerce and a low price dispersion in a frictionless market are theoretically valid in market equilibrium only.<sup>34</sup> High losses in B2C eCommerce indicate that it might not yet have reached a sustainable long-term equilibrium. (2) These hypothesis presuppose data sets and information which are very hard

<sup>33</sup> Data reprinted in Bailey 1998, Appendix 2.

<sup>34</sup> See Borenstein/Saloner 2001, 9.

to collect – e.g. data on marginal costs, degree of homogeneity of goods in the sample – so that they have to be considered as ideal-type formulations. (3) The interpretation of lower prices in B2C eCommerce and/or a low price dispersion as evidence of a high intensity of competition is a logical fallacy – “fallacy of affirming the consequent”.<sup>35</sup>

## **Policy Implications**

A frictionless B2C eCommerce market would imply that there is no market failure and hence no need for market regulation. However, the results of our analysis that there is no frictionless B2C eCommerce market in sight, lead to quite different policy implications regarding the need for state intervention in B2C eCommerce markets.

Market interventions are frequently justified by (potential) market failure and many of the above identified characteristics of B2C eCommerce: Asymmetric information, lower than expected market transparency, network externalities and increasing returns might lead to such a failure of market allocation.

Government intervention is usually considered the remedy of (potential) market failure. However, not only (potential market) failure, but also inefficiencies of regulatory policies should be taken into account. There are a number of potential sources of these inefficiencies that have to be considered (e.g. informational deficiencies, rapid technological change, regulatory capture and principal-agent problems between politicians and bureaucrats). The B2C eCommerce market is evolving rapidly, and there is now wide-spread consensus, both, in the US and within the EU that government regulation has to be reduced to a necessary minimum and that the regulatory framework has to be flexible.<sup>36</sup> Hence, the analysis of the B2C eCommerce regulation should be based on a cost-benefit-analysis of different institutional arrangements. It has to take into account private sector efforts to cope with potential market failure, as well as the proper legal framework for B2C eCommerce, which includes the allocation and monitoring of property-rights.

Heterogeneity of complementary goods, their characteristics as experience goods and resulting asymmetric information in B2C eCommerce limit consumer sovereignty and provide a rationale for government intervention. A regulatory framework for consumer protection and

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<sup>35</sup> See Barker 1989, 69.

<sup>36</sup> Currently, there is some consensus to minimise state intervention in B2C eCommerce albeit there are still substantial differences between the US, Japan and industry organisations, on the one hand, and the EU and Canada, on the other. See Mann 2000.

the protection of privacy can reduce asymmetric information with respect to the composite goods and increase market transparency in B2C eCommerce. The transnational character of eCommerce complicates such regulations, and new forms of self- and co-regulation are sought to solve these problems.<sup>37</sup>

Other potential sources of market failure are network externalities and increasing returns to scale. Network externalities (but not network effects) play an empirically minor role in B2C eCommerce as direct network effects are internalised by the B2C eCommerce companies, whereas indirect network effects are pecuniary effects and cannot be considered externalities. The necessary condition for a natural monopoly is subadditivity, which requires declining average incremental costs in each product line of a multiproduct firm and economies of scope at or below the relevant level of output.<sup>38</sup> However, network effects and increasing returns to scale do not necessarily imply that B2C eCommerce has a tendency towards natural monopoly: Due to the heterogeneity of consumer preferences it is unlikely that network size is the only relevant factor in network choice, i.e. the B2C eCommerce company. In particular with regard to the social aspects (e.g. chat rooms) and consumer reviews, it is likely that the characteristics of other participants are an important factor. The fact that increasing returns to scale play a prominent role in B2C eCommerce does not necessarily imply that declining average incremental costs prevail at an output level at or below market volume. In this case, marginal costs increase with the volume of sales of a B2C eCommerce company after a certain threshold. If the production function of B2C eCommerce companies exhibits diminishing marginal productivity at output levels below market volume, more than one can exist in equilibrium. Limitations to the organisational and informational capacity are of special importance in B2C eCommerce.

Our arguments for low intensity of competition not necessarily imply that antitrust issues gain importance in B2C eCommerce: *(i)* Traditional retail is a close substitute for large parts of B2C eCommerce, blurring the borders of relevant markets. *(ii)* The market is still growing and regulation in order to raise static efficiency can adversely affect dynamic efficiency.<sup>39</sup> *(iii)* Market structure in high technology markets is less stable over time. Especially, in B2C eCommerce new business models, advances in technology (e.g. payment systems) and

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<sup>37</sup> Nevertheless, the capacity of selfregulation is limited due to conflicting public and private interests and because of potential principal agent problems.

<sup>38</sup> See Panzar 1990, 27.

<sup>39</sup> See Klodt 2001, 44.

innovative marketing strategies might lead to rapid changes in market structure and limit market power. (iv) Although the growth rates of B2C eCommerce were impressive in recent years, market volume is still relatively low relative to the traditional retail market, but also in relation to traditional catalogue sales.<sup>40</sup> Consequently, B2C eCommerce companies still struggle to increase their customer base so that market power is still limited even for those companies dominating the market.

Albeit the abuse of market power in B2C eCommerce does not appear to be a pressing problem, size and endogenous barriers to entry are important. Small and medium sized enterprises (SME) face barriers to adoption of B2C eCommerce so that a policy that aims at a fast diffusion of B2C eCommerce within SMEs needs to actively support them.

## **Conclusions**

In this paper we challenge the widely held view that B2C eCommerce markets are, or at least tend to be frictionless. We summarise and classify the common arguments for frictionless eCommerce markets as widely technology centred, as they are based on options provided by internet technology, but duly fail to account for industrial economic considerations and empirical evidence: Heterogeneity of composite goods, limited market transparency, endogenous sunk costs, network effects, increasing returns to scale and positive feedback-loops. Further we argue that some business strategies limit the intensity of competition in B2C eCommerce: Price discrimination, lock-in effects and bundling. Even though the arguments for a frictionless B2C eCommerce market are not dismissed, we argue that those against a frictionless market eventually prevail. Although some of these characteristics lead to (potential) market failure, we argue for a sensible use of government interventions, taking into account possible inefficiencies of regulatory policies due to rapidly changing technology and business strategies. Nevertheless, heterogeneity of composite goods and asymmetric information limit consumer sovereignty and provide a rationale for consumer and data protection regulation. Furthermore, size plays a crucial role in B2C eCommerce, which – together with endogenous barriers to entry – limit the exploitation of potential benefits for SMEs.

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<sup>40</sup> See Latzer/Schmitz 2000.

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