The Hidden Dynamics of Print–Online Competition in Classified Advertising Markets

CASTULUS KOLO

INTRODUCTION

Over time, classified advertisements have become an increasingly important revenue source for newspaper publishers. In 2003, 88% of the total revenue of US$51 billion (WAN 2004a) for daily newspapers in the US was based on advertising, of which 40% was from classified advertisements (NAA 2004). In Germany at the present moment the situation is similar, with 56% of the total revenue of €9.4 billion (BDZV 2004; Kolo 2004) being derived from advertising, of which 55% comes from classifieds. This leads to an overall contribution for classifieds of about one-third of the total newspaper revenue (31% and 35% respectively). On a global scale, with newspaper revenues for dailies at roughly US$110 billion, classified advertising amounts to almost $40 billion out of $80 billion total advertising revenue (WAN 2004a).

Classified advertisements do more than underwrite the business model for daily newspapers. They also provide content, albeit non-editorial, which is highly valued by readers and serves an important economic function. By signalling supply and demand in the corresponding markets for goods and services, publishers of classified advertisements act as information brokers, increasing transparency and driving market clearance. The principle reason why classified advertising came into being was to enhance the probability that diverse suppliers with a wide range of goods and services would reach potential customers among an equally diverse audience. Nowadays, classified advertisements in print media find themselves at risk of being bypassed by new online services. This substitution is being driven by radical and disruptive innovations based on the properties of the Internet.

Specialized online services for each category of classifieds offer far more than the mere posting of advertisements. First of all, they promise efficient mechanisms for matching supply and demand. Moreover, they facilitate not only the signalling and matching, but all or most of the transaction process in the corresponding markets, up to the final billing and delivery of the traded goods and services (see, e.g., Gareis and Mentrup 2001 for labour market processes). As a result, online classifieds sites have experienced a remarkable growth not only in terms of numbers of users and advertising customers but also – at least for the market leaders – in terms of profits.

Abstract

Classified advertisements are an important revenue source for newspaper publishers and they constitute a large share of non-editorial content, highly valued by readers. By matching supply and demand in the corresponding markets for goods and services, publishers of classified advertisements serve as information brokers increasing transparency and driving market clearance. These days specific online services for each category of classified advertisements promise a far more efficient matching mechanism at a lower price and compete with the incumbent print players. In this article we present an empirical analysis of classified advertisements in the categories of recruitment, real estate and automotive, based on data from Germany. The substitution dynamics hidden by fluctuating overall market developments are derived from a simultaneous fit of the market dependence of advertising space in newspapers and a time-dependent substitution term. The results show that approximately half of the classified print advertisements have already migrated to online players. However, this substitution seems to have reached at least a temporary saturation. Apparently, the so-called Riepl’s ‘law’, formulated at the beginning of the twentieth century, still holds true today. This ‘law’ states that once a specific technical medium has established itself in social practices it will exhibit a strong resistance to change.

Keywords: classified advertising, newspaper publishing, electronic markets, diffusion of innovations, substitution effects

Authors

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Newspaper publishers are becoming increasingly aware of the imminent threat to one of their core businesses, although they differ strongly in their interpretation of recent developments in classified advertisements. This is due to the fact that the volume of classified advertising in print media over time is determined by two different effects, which act in parallel and are, therefore, difficult to discern: (1) market effects, i.e., fluctuations in the markets for goods and services which correspond to the different categories of classified advertisements; and (2) structural effects due to the increasing level of competition with online services. Furthermore, market effects are far from uniform for each category of classifieds. They are a result of the specific interplay of demand-side and supply-side trends in each market. While an economic downturn will reduce labour demand and therefore most probably also the number of recruitment advertisements, it may at the same time reduce the demand for real estate purchases due to the lack of available capital among potential buyers, thereby driving the advertising activities of real estate agents in the opposite direction. These are the reasons why it is difficult to decide whether losses in the volume of classified advertisements can be attributed to the effects of an ongoing print-to-online migration on one hand, or market trends – equally affecting both media – on the other.

The literature on the role of the Internet for market processes is abundant with general theoretical considerations of its potential benefits. These considerations focus on reduced coordination and transaction costs, increased reach, reduced information asymmetries, faster market clearance, or more efficient pricing, to name only a few (see Choi and Whinston 2000, or Wigand and Benjamin 1995 as good examples of early theoretical papers on the matter). All these benefits are, of course, interdependent.

The potential impact of the Internet on newspaper business models has been widely discussed as a threat, due to disintermediation and competition from new players, as well as an opportunity due to additional revenue (Geyskens et al. 2002; Ihlström and Palmer 2002; Neuberger and Tonnemacher 1999; O’Reilly 1996; Outing 2000; Picard 2000; Sennewald 1998; WAN 2004c).

For classified advertisements, the reduced costs for the advertiser (the costs for the advertisement itself as well as handling costs) and for the potential customer (mainly search costs) provide a convincing argument for a rapid substitution of print advertising by online advertising. Hence online pundits were quick to predict the demise of print classifieds. ‘The Internet will eliminate classifieds as we know them,’ wrote Chris Charron, a Forrester Research analyst, in his 1998 report entitled ‘Goodbye to Classifieds’ (Forrester 1998). However, subsequent developments in the classified advertising space in the US did not indicate a sudden exodus to online sites. Moreover, there were no attempts made in research to separate substitution effects from general market trends in the loss and growth rates for advertising space in newspapers during the subsequent economic up and downturn.

In this paper we present an empirical analysis of classified advertisements in the categories of recruitment, real estate and automotive based on data from Germany. These three categories were chosen because they are by far the largest ones in terms of number, advertising space, and revenues, and they exhibit the most significant losses over the last ten years (Kolo 2004). Furthermore, as a common trait, they share a coupling to market transactions. This is not the case for all classifieds. Some categories, e.g., birth, marriage and death announcements, are not coupled to market processes and the information they provide is usually not systematically sought after (see also Heinrich 2001). In the latter respect, online services that specialize in such kinds of information do not provide the above mentioned benefits over print and, therefore, do not compete, in contrast to the three categories under consideration in this paper.

The substitution dynamics, which are at least partially hidden by fluctuating overall market developments, are derived by a simultaneous fit of the market dependence of printed advertising space and a time-dependent substitution term. Our model allows us to compute the extent and the time scale with which migration from print to online took place for all of the three categories aforementioned. With the analysis of the empirical data and the results given by the model we will intend to answer the key question addressed in this paper: “What fraction of the observed losses in advertising volume is due to substitution and what fraction is due to market developments?” The latter, of course, may yet rise again with changes in the corresponding markets, whereas the substituted part will most probably be lost.

In a discussion of the results for the three categories of classified advertisements, each having different characteristics, we will derive generalizations on the factors shaping substitution dynamics and present an outlook for probable future trends. We will conclude the paper with a critical assessment of the limitations of our approach and an outline of the issues in classified advertising deserving further research.

CONCEPTUAL FRAMEWORK AND DATA SAMPLE: MEASURING AND MODELLING MARKET DEVELOPMENTS

We don’t immediately think of a newspaper as a marketplace guide, yet for many readers this is one of its most important functions. The Sunday newspaper in particular is the place to go if one is looking for a job, a new car or an apartment. In a German survey, among
Table 1. Rates of changes in classified advertising volume for the German market, in percentages

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<tbody>
<tr>
<td>Automotive</td>
<td>−13.6</td>
<td>−9.6</td>
<td>−8.7</td>
<td>+2.9</td>
<td>−2.4</td>
</tr>
<tr>
<td>Real Estate</td>
<td>−12.3</td>
<td>−10.5</td>
<td>−9.2</td>
<td>+0.1</td>
<td>−3.1</td>
</tr>
<tr>
<td>Recruitment</td>
<td>−18.9</td>
<td>−41.1</td>
<td>−36.0</td>
<td>−4.7</td>
<td>−3.4</td>
</tr>
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*Source: ZMG (2006)*

readers of regional newspapers, the classified sections (in particular recruitment) were rated as almost as important as news about business and politics (Schulz 2002).

In the past, classified advertisements were largely determined by the relationship of supply and demand in the corresponding markets for goods and services. This pattern should have changed by now as in addition to these market effects, the effects of substitution are likely to become apparent. Table 1 shows the growth rates for the three selected categories of classified advertisements. The recent rates of change in classified advertising volume are only partly conclusive for what is actually happening. In the longer term, however, losses can be observed in all three categories, the most dramatic ones being those in the recruitment category.

In order to discern market effects and substitution effects we need a model which describes the advertising volume \( V \) in a specific category of classified advertisements as consisting of two contributions: The volume we would expect due to market developments \( V_M \) minus a volume lost due to substitution from print to online competitors \( V_S \):

\[
V(t) = V_M(t) - V_S(t) \tag{1}
\]

All volumes vary as a function of time \( t \).

The market dependence of \( V_M \) we approximate with a linear relationship:

\[
V_M(t) = \beta \cdot f(t) + z \tag{2}
\]

\( z \) and \( \beta \) are coefficients, later to be determined. These coefficients describe the dependence on the value of a market indicator \( I \) at the time \( t \).

The derivation of an indicator for each category of classifieds follows a similar logic. We look for an indicator for the corresponding market for goods and services, which in the past also matched reasonably well with the trend in the related classified advertising category. We will then be able to quantify recent deviations in print volume caused by substitution from the volume expected for general market trends affecting both media.

Market indicators can be based on either the number of transactions or the volume in terms of revenues generated. The latter is, of course, determined by the former times the revenues per transaction. Unfortunately the markets for labour, real estate and cars are not equally well documented. We therefore have to resort to auxiliary measures for market developments.

As an indicator of the number of transactions in the recruitment sector, i.e., the number of placements of candidates in new positions, we take the number of vacant positions reported by employers to the Bundesagentur für Arbeit, a public agency responsible for the administration of labour market policies (BA 2004). We can expect that the more vacant positions available, the more job advertisements will be posted in newspapers. Due to a change in the reporting process of the Bundesagentur für Arbeit, the figures given for 2004 cannot, however, be considered in this analysis.

Similar to the recruitment category, we can expect the activity in the domain of real estate advertising to be strongly coupled to the number of property transactions. However, depending on whether the market is demand driven or supply driven, the correlation could be positive or negative. In the case of a negative correlation, advertising activity would increase as the transaction volume goes down, i.e., as it gets increasingly difficult to attract buyers. The number of transactions in the real estate domain is not documented in Germany. But the overall volume in terms of revenues can be derived by the related tax yields (RDM 2004). For 2004 a forecast is available on the basis of the results for the first two quarters among professional real estate agents (ERA 2004).

In the automotive category, we are closest to an ideal indicator, i.e., an indicator that is directly related to the number of different items being advertised. The Zentralverband des Deutschen Kfz-Gewerbes (ZDK 2004) publishes on a yearly basis the number of used cars sold by car dealers and private sellers. Since these are derived from the official car registers for the previous year no figures are yet available for 2004.

Market fluctuations will be different over time, as well as for each market. If there is a strong coupling of advertising volume to market developments we should also expect it to vary accordingly. The three categories of classifieds under consideration strongly differ in this respect. This can be seen from the different volatilities given by the standard deviations of yearly changes in advertisement volume and in the market indicators, which we computed for the period from 1994 to 2000 excluding, as much as possible, the effects of the Internet:
Market indicator for the automotive category: number of used cars sold by car dealers and private sellers in thousands per year, as given by the Zentralverband des Deutschen Kfz-Gewerbes (market volatility: 0.06, volatility in advertisement volume: 0.06);

Market indicator for the real estate category: overall revenues for real estate transactions in billions of Euro per year, derived by the related tax yields (market volatility: 0.11, volatility in advertisement volume: 0.05); and

Market indicator for the recruitment category: number of vacant positions in thousands per year, reported by employers to the Bundesagentur für Arbeit (market volatility: 0.08, volatility in advertisement volume: 0.15)

While advertising volume in the real estate and the automotive category were relatively stable during the pre-Internet years, there was much greater variation for recruitment. Hence in the latter case we can expect market effects to be much more important for the explanation of the time series of advertisement volume than for the other two categories.

The volume of classified advertisements in newspapers is reported in mm per year by the Zentrale Marketing Gesellschaft or ZMG for all of the different categories of classified advertising (ZMG 2005). The numbers are published yearly based on reports from approximately 150 German newspapers.

By collecting data from these sources we arrived at a number of time series for at least ten consecutive years from 1994 to 2003, including in some cases final or preliminary values for 2004. The time series comprise the advertising volume in the three categories: recruitment, real estate, and automotive, and for each of these categories a time series for the related market indicator. If there were no migration from print to online, we would expect the market indicators to give a good description of the advertising volume for the specific category of classifieds in newspapers.

METHOD AND PARAMETERS: THE DIFFUSION OF INNOVATIONS IN CLASSIFIED ADVERTISING

Much research has been undertaken into the dynamics of the diffusion of innovations and a concurrent scheme is the S-shaped curve in the number of adopters versus time. This particular shape arises when a small number of early adopters are followed by the majority of adopters, who are followed again by a small number of ‘laggards’, as Rogers termed them (Rogers 2003: 284).

This behaviour across time arises from differences in the adoption process. The adoption process may be assumed as consisting of five phases: Knowledge, persuasion, decision, implementation and confirmation. In the knowledge phase an individual is exposed to an innovation for the first time. Persuasion occurs when an individual forms a favourable or unfavourable attitude towards the innovation. Decision takes place when an individual engages in activities that lead to a choice to adopt or reject the innovation. Implementation occurs when the innovation is put to use, and confirmation when the decision is reinforced after the innovation has been assessed positively, in the light of possibly conflicting information concerning its utility.

When, in at least one of the steps, a normal distribution of the respective behavioural trait is present, we will observe an S-shaped curve in the number of adopters versus time. This may already be the case in the knowledge phase when only few users appear to notice the existence of the innovation from the very beginning, e.g., the existence of a job portal start-up, followed by the majority, and finally by those people with less frequent access to information on market developments. For most diffusion processes this is indeed the shape that is observed (Henrich 2001). For classified advertisements, we would also expect a slow migration from print to online services to start with, followed by a rise in the adoption rate and finally a saturation effect when the migration of print advertisements to online is complete. This does not necessarily imply that ultimately all print advertisements will be substituted. Substitution may equally come to halt before reaching a 100%.

There are different parameterizations of S-shaped processes. The most commonly used ones are the Fisher-Pry model or ‘pumpkin’ curve, as it also describes growth processes (Porter et al. 1991), and the Bass model for diffusion processes (Bass 1969, Norton and Bass 1987). However, the choice of parameterizations is limited in this case. The maximum number of eleven data points does not allow for a large number of free parameters. Otherwise one would risk overfitting the data.

The simplest parameterization is that of the Fisher-Pry model, as it uses just one parameter to determine the shape of the S-curve, whereas in the Bass model there are two. In addition to these shape parameters, we need, in both models, a parameter for the maximum amount of substitution (or diffusion) reached at saturation, and a parameter determining the position of the diffusion process in time. The latter parameter may either refer to the point in time when diffusion started or when diffusion reaches its highest rate. In some cases a specific start time is known, for example, when the diffusion for a specific product of a specific company is modelled after its launch. In such cases no estimation of the time parameter is necessary – it is simply set to the time of the launch. However, substitution as we discuss it here is the net effect of competition with several online players who started their operations over a period of time, comparable with the total time span under consideration in this analysis. Hence we have to leave the determination of the position of the substitution process over time to be estimated. Indeed, as will be shown, substitution took
off much later than the time of the launch of the first online service in each of the three categories of online classifieds. This is no contradiction, as the launch of a new service is a necessary but not a sufficient condition for the substitution of the traditional one.

With the Fisher-Pry model the approximation of the substitution term $V_s$ at time $t$ in the total volume of printed classified advertisements becomes:

$$V_s(t) = \delta \left( \frac{1}{1 + e^{-\sigma(t-t_s)}} \right)$$

(3)

$\delta$, $\sigma$ and $t_s$ are parameters for the maximum value of substitution, the speed or rate of the substitution, and the point in time when the maximum migration from print to online occurs. Generally, an S-shaped curve implies that the rate of adoption is not constant over time. In the case of the Fisher-Pry model, it changes in a symmetric bell-like curve from zero to a maximum value at time $t_s$ to zero again when saturation has occurred. The rate is proportional to the number of already existing adopters and the number of potential adopters. In this respect, also, the simple Fisher-Pry model accounts for network effects which we would expect in the case of online classifieds: the more advertisements are available, the more users are attracted to the service and, therefore, the more advertisers will be inclined to move from print to online.

With a Bass model the substitution term $V_s$ at time $t$ becomes:

$$V_s(t) = \delta \left( \frac{1 - e^{-(\phi+\varphi)(t-t_s)}}{1+(\phi/\varphi)\cdot e^{-(\phi+\varphi)(t-t_s)}} \right) \text{ for } t > t_s, \text{ else } 0.$$  

(4)

$\phi$ denotes – as in the Fisher-Pry model – the maximum value of substitution reached at saturation. In the literature it is sometimes referred to as index of market potential (Rogers 2003: 210). $\psi$, in this case is the moment in time when substitution (or diffusion) starts. $\phi$ and $\varphi$ are the parameters determining the shape of the curve. They are called the ‘innovation factor’ ($\varphi$), which refers to the probability of initial adoption independent of the influence of previous adopters, and the ‘imitation factor’ ($\phi$), which refers to the pressure of previous buyers on imitators (Bass 1969). The key elements of the Bass model lie in a formalization of the interplay of two different communication channels important in the diffusion process: mass media and interpersonal channels. While there are many publications on further refinements of the Bass model and reviews of their applications in the context of diffusion there are none on substitution dynamics (see Mahajan et al. 2000 and Rogers 2003 for recent reviews of the literature related to the Bass model). Although substitution is linked to diffusion, the theoretical soundness and meaning of the Bass model in the case of substitution would have to be shown to justify the application of this more complex model. Moreover, the Bass model has another disadvantage in our case. In order to apply the Bass function either the start time of the process has to be known or the fitting procedure has to account for the fact that the Bass function is not defined for $t < t_s$. The latter can be circumvented in principle, but imposes practical problems for standard statistical software packages. Hence, the Bass model is typically applied when the market entry of a specific company’s product or service is known and the further growth of sales is forecast based on the sales observed during an initial period of time. However, we do not consider a specific company’s service with a clearly defined launch time here, but try to model the substitution of print advertisements in each category at a generic level, as an aggregated effect of the operations of several online services, who launched their sites at different times.

If we change the perspective from print to online and model the growth of online advertisements of a specific online service with a known start time of its operation, then the Bass model would be applicable, provided that there is enough data to fit the additional free parameter for determining the shape of the S-curve. As a further confirmation of our analysis from the print perspective we will discuss such a model in a later section.

A detailed discussion of the several models available to fit S-shaped processes would go beyond the scope of this paper (for such a discussion see, for example, Mahajan et al. 2000; or Porter et al. 1991). The Fisher-Pry model will suffice, as we will show: (1) to answer the key question, “What fraction of the observed losses in advertising volume is due to substitution and what fraction is due to market developments?” and (2) to show whether the development of advertising volume in print follows an S-shaped substitution. Obviously, the most we can conclude from this is whether the process is S-shaped at all. With more data points available, it would certainly be rewarding to apply a more complex model adjusting independently the slopes at the beginning and at the end by fitting more than one parameter to determine the overall shape of the S-curve.

Applying the Fisher-Pry model in our analysis and therefore combining equations (2) and (3) for the total volume $V$ at time $t$, we arrive at the following complete model:

$$V(t) = \beta l(t) + \alpha - \delta \left( \frac{1}{1 + e^{-\sigma(t-t_s)}} \right)$$

(5)

In order to see whether indeed market influences and substitution effects work at the same time we conducted three different fits to the time series for each of the three categories of classified advertisements:

- A pure market model with two free parameters as given by Equation 2;
- A pure substitution model as given by a constant (also a free parameter) minus Equation 3; and
• the combined model (market effects plus substitution) given by Equation 5.

Nonlinear regression works by varying the values of the free parameters to minimize the sum-of-squares in an iterative process (see, for example, Bates and Watts 1988, Gallant 1987). The goodness of fit can then be quantified by the value of $R^2$. One can interpret $R^2$ from nonlinear regression very much like that from linear regression. When $R^2$ equals 0.0, the curve fits the data no better than a horizontal line going through the mean of all the values of the dependent variable. When $R^2 = 1.0$, all points lie exactly on the curve with no scatter. $R^2$ is computed from the sum of the squares of the distances of the points from the best-fit curve determined by the nonlinear regression ($SS_{reg}$), and the sum of the squares of the distances of the points from a horizontal line through the mean of all values of the dependent variable ($SS_{tot}$):

$$R^2 = 1 - \frac{SS_{reg}}{SS_{tot}}$$  \hspace{1cm} (6)

When comparing two models and the more complicated model fits better in terms of a higher $R^2$, then the question is whether this decrease in sum-of-squares is worth the ‘cost’ of the additional variables or loss of degrees of freedom (DF), i.e., the number of data points minus the number of free parameters. The question can be answered by applying a so-called $F$-test. The $F$-test is only strictly valid when the simpler equation is a special case of the more complicated equation. In other words, the two models should be nested, which is the case when we compare the complete model to either the pure market model or the pure substitution model.

In order to apply an $F$-test we need to compute the $F$-ratio for the two fits that are to be compared. The $F$-ratio quantifies the relationship between the relative decrease in sum-of-squares and the relative decrease in degrees of freedom for the better fitting but more complex model 2 and the simpler model 1.

$$F = \frac{(SS_{reg1} - SS_{reg2})/SS_{reg2}}{(DF_1 - DF_2)/DF_2}$$  \hspace{1cm} (7)

If the simpler model is correct, one gets an $F$-ratio near 1.0. If the ratio is much greater than 1.0, there are two possibilities: either the more complex model is correct, or the simpler model is correct, but random scatter will have led the more complex model to fit better. The so-called $P$-value tells us then how rare this coincidence would be. It is a probability that can be derived from tables given in most handbooks on statistics (e.g., Sachs 2002). These computations can, of course, be extended for the simultaneous comparison of two models for three different data sets as in our analysis.

The best result in terms of $R^2$ is obtained by the combined model (see Table 2). The variance in the measured data explained by this model ($SS_{reg}$) was in all cases remarkable, ranging from 0.959 in the case of automotive advertisements to 0.994 in the case of real estate. The same result can be seen when we compare the sum-of-squares ($SS_{reg}$).

But how significant is the improvement in the goodness of fit when we move from the simplest model

<table>
<thead>
<tr>
<th>Table 2. Model parameters ($\beta, \alpha, \delta, \sigma, \tau$) and measures for the goodness of fit ($SS_{reg}$, $R^2$, DF)</th>
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<tbody>
<tr>
<td><strong>Fisher-Pry model + market model</strong></td>
</tr>
<tr>
<td>$\beta$</td>
</tr>
<tr>
<td>Automotive</td>
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<tr>
<td></td>
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<td>Real estate</td>
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<td>Recruitment</td>
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| **Note:** Explanations for the model parameters are given in the text. $SS_{reg}$, $R^2$ and DF denote the sum-of-squares, the explained variance, and the degrees of freedom of the fit. They are computed from values of the dependent variable normalised to 100 for the year 1994. This ensures that in addition to $R^2$ and DF (which are independent from the units of the dependent variable), the values for $SS_{reg}$ are also directly comparable.
(given by Equation 2) via the pure substitution model (given by a constant minus Equation 3) to the complete model (given by Equation 5)?

The $F$-ratios calculated from the values for $DF$ and $SS_{reg}$ for all of the categories of classified advertisements together and for each model show that the complete model was indeed significantly better (at the 5% level given by the $P$-value) than either the pure market model or the pure substitution model. However, if we compute the $F$-ratios individually for each category of classified advertisements, we see that in the automotive category a pure substitution model fitted almost as well as the complete model. The improvement in this case was only significant at the 10% level.

Table 2 also shows that the relative contribution of the market and the substitution term to explaining the data was indeed different for the three categories of classified advertising. The market term was most relevant for the recruitment category, and only played a minor role in the analysis of the other two. This is not surprising, because, as we have shown above, advertising volume in the recruitment category exhibited a high volatility, driven by fluctuations in the labour market, both before and after the introduction of online classifieds.

The fit with the complete model based on Equation 5 leads to different values for all coefficients (see Table 2). Above all, this was because the advertisements in these categories were coupled to different markets. Moreover, it is interesting to see that the coefficient $\beta$, which stands for the influence of the market indicator ($I$) on the advertising volume expected from market conditions ($V_M$), does not have the same sign for all categories. While the advertising volume is expected to rise with an increase in the number of cars sold, or the number of job openings, it decreases with the volume of property transactions in the real estate business.

Also, for the other coefficients $\delta$, $\sigma$ and $\tau$, we derived different values in each category. In the recruitment category, substitution had the greatest impact (highest $\delta$), and occurred faster (highest $\sigma$), though at a later point in time (highest $\tau$), than in the other categories. The specific diffusion dynamics of innovations in classified advertising are represented for each of the categories by the set of values for $\delta$, $\sigma$ and $\tau$. We will come to a discussion of these dynamics in the following section.

Having determined the coefficients, we are now in a position to discern market from substitution effects. Figure 1 for each of the three categories shows on the left the model behaviour and the expected behaviour if there were no substitution effects. On the right hand side of Figure 1 we can see that the market term is relevant in all three cases to improve the fit to the observed advertising volumes. When we adjust the observed volumes by the substitution term – as given by the fit – the resulting values should correlate well with the values for the market indicators, which is the case (at least at the 5% level) as the plots of the adjusted values for the advertising volume versus the values for the market indicators illustrate.

The increasing difference between the measured values and the expectations if there were no substitution effects illustrates the migration from print to online. However, from the example of automotive advertisements it also becomes clear that a decrease in volume is not necessarily attributable to substitution. From 2000 to 2003 advertising volume was expected to shrink due to worsening market conditions, albeit not to the extent that actually occurred. On the other hand, although measured advertising volume increased from 1997 to 1999, substitution was already taking place in parallel.

**DISCUSSION: FROM SUBSTITUTION TO COEXISTENCE?**

We will now turn from the results of the analysis to a discussion of the factors which may have shaped the observed substitution dynamics. In addition to this we will outline future trends and their possible impact.

Figure 2, left, shows the diffusion process for advertisements in the recruitment, real estate and automotive categories, or rather the migration process if we take the perspective of a print publisher. The processes differ for each category in the rate of diffusion as well as in the point in time when maximum diffusion took place. When we compare the observed advertising volume with the one we would expect if no substitution had occurred, we can compute the amount of advertising volume which was lost due to online competition. These losses amount to approximately 50% in the case of recruitment and 40% for the real estate and automotive categories.

The observation of losses in the print sector is reflected in a parallel growth of online advertisements, which is shown on the right hand side of Figure 2. Growth in the real estate category took off much later than it did for the automotive category. This is consistent with the results from the print perspective with substitution also occurring later. However, the developments in print as discussed above and the developments online do not match completely. This is understandable, since in the case of online advertisements we only have the data for one of several players in each category. Unfortunately, there are no figures available for total online classifieds in each market, and for the recruitment category not even the data from the current market leader was disclosed.

For the values given for the market leaders in the automotive and the real estate category we also tried to fit an S-shaped diffusion curve plus a market term as explained in the section above. A pure market model does not explain the observations as becomes obvious already by regarding Figure 2. A fit with any of the discussed diffusion terms is significantly better (at the 5%
However, due to the limited number of data points (8 in this case), the comparison of the fits with a pure diffusion term given by either the Fisher-Pry or the Bass model (which in this case is well applicable because the start time is known), and the combined fits with a diffusion and a market term show no significant differences. Figure 2 illustrates the fit result with the Bass model. The values obtained for the parameters $\phi$ and $\varphi$ indicate that diffusion is dominated by the ‘imitation factor’ ($\phi$) which accounts for the social contagion of the adoption process, i.e., strong network effects.

A number of characteristics of the three categories of classified advertisements may be responsible for the differences in substitution dynamics and diffusion dynamics respectively. However, with just three examples from one country we can only venture a tentative explanation.

In Germany most of the companies currently dominating online classifieds were founded between the mid and the late 1990s. If we take a look at the market leaders, it is interesting to note that though jobpilot.de (the dominant player in online job postings) was founded in 1995, one year before mobile.de (the current market leader), the company was only able to achieve significant market share through strongNETWORK EFFECTS.
number one in the automotive category), and three years before immobilienscout24.de (the market leader in real estate), the migration from print to online at the market level took off in a different order. From this we may conclude that the moment in time when competing online services were set up can hardly be the determining factor for the time scale in which substitution occurred. However, there is another difference that may provide an explanation. The process of adoption of an innovation is much more complex in an organizational environment. Here we would expect that during the adoption process the uptake of an innovation would exhibit a much longer time lag from the knowledge phase to the decision, implementation and finally the confirmation phase. Indeed, this seems to be the case for advertisers in the area of recruitment, as the majority of these are companies. The decision to post an advertisement in print or online is not left up to an individual but involves a discussion and decision process within the organization. On the other hand, advertisements in the automotive category are largely posted by private individuals. In the middle of these two extremes is the real estate category, where the bulk of advertisements come from small or semi-professional agents, in many cases represented by a single person.

With reference to the rate of diffusion, advertisements in the recruitment category migrated much faster than in the case of real estate, with the slowest being the automotive category. Also with regard to this parameter, of the substitution dynamic, the degree to which an advertiser makes their decision in an organizational context may serve as an explanation. Private individuals as advertisers usually have less access to information concerning innovations than companies, where there is regular discussion of new approaches, for example, in the recruitment process. Though the implementation of an innovation may take longer as it imposes a higher risk and is more difficult to reverse in an organizational environment, penetration may nevertheless proceed faster when the advantages become evident and this information is relayed between companies. For individuals, on the other hand, it is much more a process of trial and error, which could explain why in the case of the automotive category in particular, the diffusion process took a lot longer than for the other two categories. Additionally, individuals generally post one advertisement at a time (because usually this involves the sale of a single vehicle) and therefore a positive innovation decision does not necessarily trigger subsequent postings.

Finally, the extent to which substitution occurred may be explained by the online affinity of the target audience. The higher the percentage of Internet users among the latter, the more it makes sense to place an online advertisement. On the other hand, if a large fraction of the target audience is not online, at least one additional print advertisement is necessary to achieve maximum impact. If this argument holds true, then the extent of print-to-online migration can be expected to be determined by the level of Internet penetration. This is the case, with Internet penetration being higher in the target group of recruitment advertisements than in the other two categories. This is consistent with the observation of a higher level of substitution in this category. Job postings generally address an audience between 20 to 45 years old. In the case of Germany, 68 percent of these are Internet users compared to an average penetration of 59 percent for the ages of 14 to 64 (ACTA 2004).

Though many overestimated the impact the Internet was having on other media sectors, the reverse was true in the case of newspaper publishers. In 2003 the World Association of Newspapers asked whether classified advertising would move from print to the Internet and responded that ‘the migration of classified advertising from print to the Internet is probably inevitable, but the
impact will likely be felt in the long-term and not in the near future…” (WAN 2003). In Germany, print publishers largely expected that classified revenues would surge to previous levels when general economic growth took off again (Ernst & Young 2003).

For the moment print-to-online migration seems to have reached saturation level, at least temporarily. This can be observed in all three categories and may be explained by the so-called ‘Riepl’s law’. This was originally formulated by Wolfgang Riepl in 1913 for news media in ancient classical times. It states that once a specific technical medium has established itself as a means of social communication it will be resistant to substitution, even by a new medium which is technically more advanced. Although established media will continue to be used, they will probably be forced to change their content or their fields of application respectively. This hypothesis has proved to be true for the development of traditional media like newspapers and the radio, and it may well apply to the effects caused by the use of the Internet.

For the time being, Riepl’s law still seems to be valid, and newspaper publishers are entering a new phase of coexistence of both traditional and new forms of classified advertising. After an initial first wave of rapid migration we should now expect a more gradual substitution process driven by a new generation who have grown up with computers and the Internet. This generation, when they become adults, will be much more inclined to use online services than the traditional print medium, when looking for a job, an apartment or a car. As a consequence, the potential number of buyers or job seekers who don’t use the Internet will literally dry up. However, this is a process of generational change, which will of course take time.

This point of view is consistent with forecasts given by Jupiter Research (2003) for the online classifieds market. Online services in the areas of recruitment, real estate and automotive, have left behind their initial phases of exponential growth. Although they are expected to grow from US$1.2 billion in 2003 to about US$2.2 billion in 2008 (a growth rate of 16% per year) this still remains a figure which is rather modest for an online business. Furthermore, the growth in revenue is expected to be driven by a large extent by additional services and price increases due to the consolidation of national markets.

In the last instance, Riepl’s law of the survival of the old media will cease to apply. When the old medium is not perceived as having any intrinsic advantage compared to the new medium, it will simply wither away. The cost advantage of online media compared to traditional print media is obvious. Apart from this, they are more efficient in the matching process and provide additional advantages via the digitalization of the market processes which underlie the categories in classified advertising. Hence the perceived advantages of print media will only continue for a limited period of time.

SUGGESTIONS FOR FURTHER RESEARCH

Our analysis of the diffusion of innovations in classified advertising and the substitution of print advertisements has several shortcomings based on the limited availability of market data in Germany and a lack of comparable analyses with data from other countries.

There may be other factors, apart from the share of company advertisers among advertisers, and the online affinity of the target audience, that explain the discrepancies in the fitted parameters for the three categories of classified advertisements. Among these we could consider the price ratio of online to print advertisements, the critical importance of timing (i.e., the typical timescale of the transaction in the market process corresponding to the different categories of classifieds), and the degree to which the digitalization of the matching phase in the corresponding market process increases its overall efficiency. The latter point becomes clear when we look, for example, at postings in the automotive category. In contrast with a print advertisement, an online posting could be coupled to an immediate purchase, a digital billing process, and a selection of the modalities of delivery – and all these consecutive steps carried out without a change of the transaction medium.

These limitations may be overcome by an extension of the analysis to other markets. In principle, the same method should be applicable for other classified advertising markets. Results for more than the three categories discussed here, be they results for additional categories of classified advertisements, or results for the same categories but from other countries, could shed further light on the key factors involved in the underlying dynamics of the diffusion of new technologies which have a disruptive effect on existing practices related to traditional media.

Another issue in classified advertising which deserves further research is the question of the possible impact caused by the substitution of print advertisements by new and more efficient online applications. This impact can be expected to be seen on two levels: (1) on a company level among newspaper publishers; and (2) on a macro-economic or market level.

1. Though the losses of advertising volume in print appear to be dramatic at first, the impact on newspaper publishers has so far been limited. This is due to the fact that in parallel to their shrinking print revenues they have taken measures to reduce their costs. In addition to this, some newspapers are aggressively and proactively trying to ensure their control of the digital classified market at the same time. As a result, this latter group is likely to succeed in keeping their market share and profits (WAN 2004b).
2. An even more substantial impact than that which affects individual publishers may well be observed in the markets to which the three different categories of classified advertisements are coupled. A more efficient matching process may lead to more transparency and faster market clearance. This is particularly relevant to the labour market, where the potential effects of the digitalization of the related transaction processes have been discussed on a theoretical level (Gareis and Mentrup 2001; Kauffman and Walden 2001; Kuhn 2000), but to our knowledge have not yet been investigated on an empirical basis. In other markets, where efficient signalling and subsequent matching of supply and demand among a wide audience is essential, the new services based on the properties of the Internet can also be expected to have an impact not only in terms of online advertising revenue, but also on the dynamics of the markets themselves.

References


