The Benefits of Complete Business Listings

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Contents

Executive summary

Google commissioned Oxera to examine the extent to which additional information in Google My Business listings (such as photos or opening hours) can contribute to vibrant and growing communities through better linking consumers and businesses. This report considers how this information could benefit people and businesses, and estimates the potential size of these effects using evidence from a recent survey by Ipsos MORI,[1] economic literature and statistical analysis. The main findings of the research are as follows.

Consumers are able to:

- find the information they need faster. Consumers reported that they would save 0.74 minutes per record when they saw a verified listing. We estimate that this could be worth around $9 to a consumer over a year for each type of business they find using Google.[2] In small communities, time savings could be worth more than $100,000 a year, while in large cities it could be between $2m and $6m a year;
- have greater confidence in the businesses they see when the listing is verified. Businesses whose listings are verified are twice as likely to be considered 'reputable';[3]
- find the right product and service for them. 79% of users report that having business information on the search engine results page would allow them to find a business that better matches what they are looking for.

Businesses are able to:

- generate more online activity. Our analysis shows that additional information is associated with at least a 30% increase in homepage click-throughs;
- realise savings in customer acquisition. Entries for firms with more information about themselves are associated with additional online activity. If the cost of a click is worth $0.62, we estimate that this could be worth around $250 a year per business. In small communities, the additional traffic could be worth between $140,000 and $315,000 a year, while in large cities it could be between $850,000 and $7m a year.

[1] Ipsos MORI (2014), 'Impact of Search Listings for Local Businesses', August.
[2] Categories: florist, mechanic, hardware store, bakery or salon/barber shop.
[3] Ipsos MORI survey, question 27, part 9.

1 Introduction

Google My Business is a popular business directory which incorporates Google Maps, Google Search and Google+. These directory records allow consumers to find businesses or organisations within a category and also provide travel directions for a variety of transport modes. The listings also allow organisations and individuals to add a range of additional information about the organisation (such as pictures, opening hours, website address) to their listing.

1.1 Verification

Google also allows businesses to verify their business listing. Verification is where the business itself contacts Google directly[4] to 'claim' its business, and can also update and confirm information relating to its record. Once a business listing is verified, other users cannot edit the record.

The act of verification does not necessarily involve adding any information to the business listing. It is possible for an unverified record to contain the same amount of information, and the verification status of a listing is not prominently displayed. As a result, the act of verification itself is unlikely to have a large impact on the growth of communities; however, it is the easiest way for organisations to have more control over the information presented and for consumers to use that information to make better decisions.

For the purposes of this study we take verification as a shorthand for organisations displaying more information, such as opening hours, showing photographs to differentiate themselves, and giving more information on the services they offer.

Google has commissioned Oxera to examine the extent to which this additional information can contribute to vibrant and growing communities through better linking consumers and businesses. While there are a range of potential definitions for a vibrant and growing community, we have limited the analysis presented here to considering economic outcomes (e.g. GDP) and well-defined economic outcomes (e.g. consumer welfare).

This report is structured as follows.

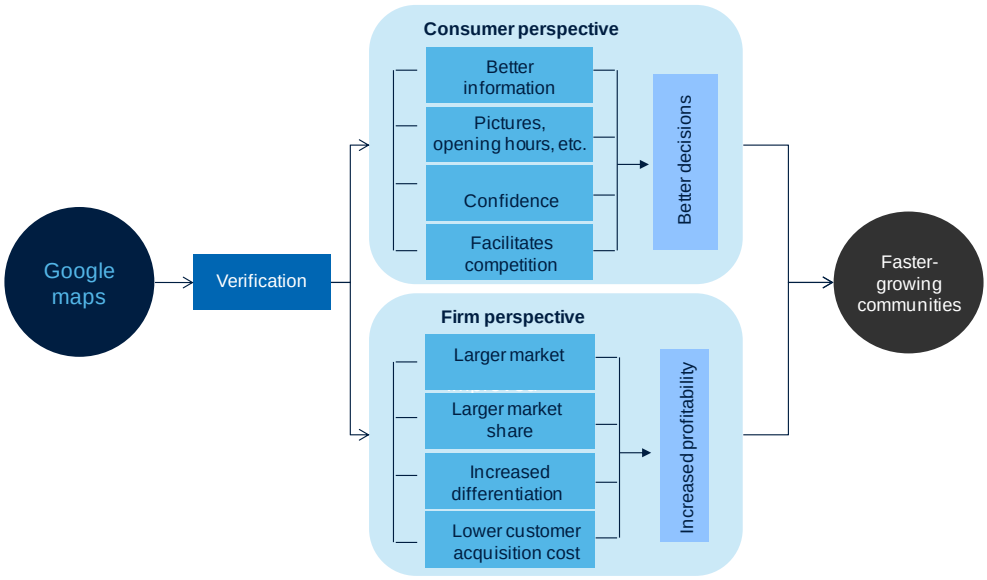
- Section 2 discusses how verification can lead to benefits for businesses and consumers, and therefore communities.
- Section 3 sets out the conceptual basis for consumer benefits and assesses the evidence for this from a recent survey carried out by Ipsos MORI.[5]
- Section 4 outlines our approach to estimating verification benefits from a business perspective.
- Section 5 maps the verification benefits on to specific communities
- Section 6 outlines the conclusions of the research.

[4] This can be done by phone, post or using an 'instant verification' process for users who have already verified their business's website.
[5] Ipsos MORI (2014), 'Impact of Search Listings for Local Businesses', August.

2 Mechanisms by which verification can lead to economic benefits

This section explores some of the ways in which verification on the Google My Business directory could lead to economic benefits. For the purposes of this study, we have considered businesses and consumers separately, as the benefits to these groups are likely to be materially different in nature. Figure 2.1 sets out the mechanisms by which the features that verification enables on Google My Business may contribute to the prosperity of communities from the perspective of consumers and firms.

Figure 2.1 How verification could affect consumers and firms



Source: Oxera.

Verification could allow a **firm** to:

- reach a larger market of potential customers who might not otherwise be aware of its offering. Firms may be able to compete for larger market shares individually—however, this is a benefit that is likely to accrue at firm level, for a given market size, since one firm's market share must contract in order for another's to expand;
- use information and pictures to better differentiate itself from its competitors, increasing revenue and profits;
- acquire new business/customers at a lower cost than before, making the firm more efficient and productive.

These factors are expected to improve a firm's profitability by either increasing revenues or lowering costs.

Verification can help **consumers** by:

- reducing the time spent searching for information on a business. In an environment where time is increasingly valuable, time savings are an important form of economic benefit. For example, providing opening hours tells the consumer whether a car repair garage is open on a Saturday afternoon before attempting to visit them;

- providing better information about the nature of services offered and the experience that consumers are likely to have, from photos, links and reviews. This could help consumers better match their choice of business to their preferences, meaning consumers have a better experience and are more satisfied;
- supplying them with more information, thereby increasing confidence that a business is legitimate or still exists;
- giving them the opportunity to compare between offerings or discover new businesses offering the produce or service they are looking for. This facilitates competition and is likely to lower prices and/or increase quality.

These factors can all improve consumers' decision-making, meaning that they may obtain more welfare or satisfaction from their experience.

It is important to be aware that the consumer and firm benefits can be considered two different sides of the effect on communities, and therefore it is not appropriate to simply add them together. For example, facilitating competition in order to lower prices or increase quality may transfer welfare from producers to consumers.

Along with other factors, increasing consumer welfare and making firms more competitive is likely to lead to more prosperous communities by encouraging innovation by businesses, driving cost efficiency and ensuring that the most productive businesses thrive.

Sections 3 and 4 outline evidence for these benefits for consumers and businesses, respectively, as well as the link between these and overall prosperity and growth.

3 Consumer benefits

3.1 Ipsos MORI survey

We have used the results of an Ipsos MORI survey[6] commissioned by Google to quantify the magnitude of the benefits discussed in section 2. The Ipsos MORI survey was designed to give insight into consumers' use of search engines and online maps. The 20-minute survey, involving 1,000 participants, took place in the two-week period between 8 and 22 July 2014. This section explores the findings of the survey, its relevance to the benefits outlined in section 2, and the wider implications for economic prosperity.

Respondents were filtered so that they all had purchases from one of five categories—bakery, mechanic, salon/barber shop, flower/plant shop and hardware store—with a minimum of 100 respondents per category.

The survey was split into several sections, three of which are particularly relevant to this study.

- The 'Purchase Process' section explored the approach taken by respondents in their decision-making process for purchases made in the last six months. Responses in the section provide insight into types of information searched and used prior to the purchase. They also provide insight into the value to consumers of information such as reviews, product service descriptions and the phone number of a business in the decision-making process prior to a purchase.
- In the 'SERP (Search Engine Results Page) Test', participants were randomly assigned either a full verified listing or a minimal unverified listing for a business in the category they had purchased from. Based on this information, respondents were asked about their perceptions and expectations of the business.
- The 'Search Listings' section of the survey posed a set of hypothetical questions exploring the value placed by consumers on the provision of business information such as reviews, photos and opening hours, in the context of searching for local businesses to purchase from.

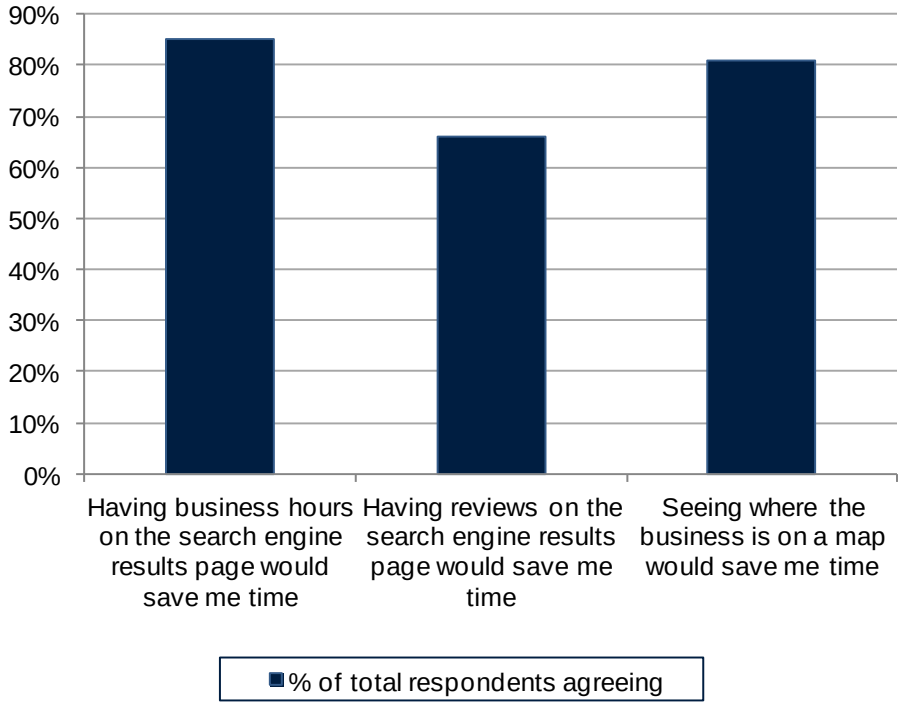
3.2 Time savings

Time is a resource and has a value, and this increases as we become busier as a society. The question of how time is spent has implications for people's well-being because of the opportunity costs (benefits forgone) of spending time on one thing as opposed to another. For an individual, time could be 'spent' on leisure activities or used to work and earn income. For businesses, employee time savings can be thought of as the value of goods and services those employees are able to produce in that time.

The Ipsos MORI survey suggests that consumers did feel they saved time from information provided through verification. 85% of all respondents agreed that having business hours on the search engine results page would save them time.[7] Similar savings were reported for reviews and mapping, as shown in Figure 3.1.

[6] Ipsos MORI (2014), 'Impact of Search Listings for Local Businesses', August.
[7] Ipsos MORI survey, question 32, part 2.

Figure 3.1 Increased information and time savings



Source: Ipsos MORI survey, question 32, parts 2, 3 and 5.

To assess the prevalence and magnitude of potential time savings, half of the respondents were shown a verified listing with a full set of information on the business, while the other half were shown an unverified listing with limited information. Respondents were shown records for different types of business depending on their previous purchasing experience.

Respondents were asked to state the length of time they would spend looking for additional information (if any). The difference between the responses for those who saw the verified listing compared with those who saw the unverified listing represents the typical amount of time that users would spend looking for the omitted information in the unverified record. That is, this difference represents how long they expected to spend searching for the missing information. For survey respondents as a whole, the group which saw the unverified listing reported that they would spend three-quarters of a minute longer searching for information. A more detailed set of results is presented in Table 3.1 below.

The results suggest that with the exception of customers of florists, all sectors and customer groups reported time savings from seeing a verified listing. Conversely, customers of bakeries reported time savings of more than four times the average. Both of these results appear surprising, but it should be noted that the sample sizes for the individual sectors are relatively small (each sector had around 200 respondents, of which 100 each saw the verified and unverified listings). Small sample sizes make the results more susceptible to statistical 'noise' (such as large outliers). As such, the aggregate-level result is perhaps more reliable. It should be noted that the variation in the responses was also very high.[8] As a result, it is perhaps not surprising that when tested statistically the additional search time associated with an unverified listing is not significantly

[8] The standard deviation for the responses was 14.8 compared with a mean of 13.

different between groups.[9] Thus, we cannot rule out the possibility that the 0.74-minute difference was due to statistical 'noise' in the data.

However, other aspects of the survey do support the premise that complete listings are likely to save time – 67% of respondents viewing complete listings stated that the listing provided all the information they needed compared with 41% for incomplete listings.[10] A substantially lower number of respondents continue web searching after seeing a complete listing.[11] Nevertheless, the results should be treated with caution, although they are still a useful source of data for estimating benefits from information availability.

Table 3.1 Reported time savings by sector and customer type

	Unverified average time (minutes)	Verified average time (minutes)	Average time savings (minutes)
Average	13.67	12.93	0.74
Bakery	12.67	9.23	3.45
Mechanic	17.51	17.43	0.09
Salon	13.00	12.74	0.25
Florist	12.16	14.26	-2.11
Hardware store	13.08	11.12	1.96
Male	12.58	11.78	0.80
Female	14.69	14.06	0.63
Age: 18–34	14.51	13.49	1.02
Age: 35–64	13.11	12.53	0.58

Source: Ipsos MORI survey, question 27a.

3.2.1 Value of time

The US Department of Transportation provides a range of monetary values of time for the purposes of transport project appraisals (transport projects often result in changes to journey times). The suggested values range from $12 per hour for personal, local travel time to $57.20 per hour for business air and high-speed rail travel time.[12] For the purposes of this study we have assumed that all time savings are leisure time because the Ipsos MORI survey is focused on consumer purchases rather than business-to-business transactions. On the basis of this assumption, time would be valued at $0.20 per minute in 2009 prices ($12 per hour in 2009 prices, equivalent to $13.03 per hour ($0.22 per minute) in 2013 prices). However, to the extent that there would be some purchases being made during work time, this represents a conservative estimate.

The estimates above give an indication of the reported benefits to consumers for each business listing they look at. It is also possible to estimate how these benefits might accrue over a longer period. To do this, two items of information are needed. First, it is necessary to identify the number of purchases made by consumers per year. There are variations in the frequency of purchases between

[9] In this case a t test for unequal samples and pooled variance and the Welch test for unequal variance were conducted.
[10] Ipsos MORI survey, question 29a.
[11] Ipsos MORI survey, question 27a.
[12] US Department of Transportation (2011), 'The Value of Travel Time Savings: Departmental Guidance for Conducting Economic Evaluations, Revision 2', September, p. 21.

different product categories. Bakery products are the most frequently purchased, with 31% of respondents in this category reporting making purchases at least once a week. This contrasts with the mechanic category, where 69% of respondents reported purchasing several times a year. The other three categories follow a similar pattern in that the majority of the purchases occur several times a year. A weighted average of the survey results is used to calculate the frequency of purchase in each category.[13] We have used a value of two when respondents report making 'several' purchases per month and year. This represents a conservative assumption.

The second item of information needed is the number of businesses a consumer looks at when making a purchase. Estimates from previous Google research provide insight into consumers' path to purchase through exploring what consumers research online, the duration of time spent researching, the average number of sites visited prior to purchase and the contribution of search to a consumer's decision-making. The study suggests that consumers search through 4.4 websites on average when making a purchase.[14] It is worth noting that the study used to compile this estimate was based on sectors different from those considered in the Ipsos MORI survey. Furthermore, the estimate does not refer directly to the number of Google Maps entries a user might view. However, for the purposes of this analysis, it provides an indicative measure of the online search behaviour of consumers.

An important caveat to this analysis is that consumers may not conduct a thorough online search before each purchase. While there are numerous surveys that suggest online research followed by an offline purchase is commonplace,[15] we are not aware of any empirical data on the frequency with which search accompanies purchase. Intuitively, it seems reasonable to assume that search could occur more than once a year as the context and objectives of a purchase (e.g. customers buying in different towns or seeking a different type of product from the same broad class of business), can vary and this might require a new search. It is also likely that search behaviour will vary across sectors.

Furthermore, the estimates only apply to customers who purchased from one of the sectors investigated in the Ipsos MORI survey; therefore, it is possible consumers could experience time savings when purchasing from other sectors or indeed purchasing from more than one sector leading to additional benefits.

While it would be preferable to make adjustments to account for the caveats above, in the absence of any suitable empirical evidence we take the 0.74-minute estimate as indicative of the time saving associated with complete information. From this it is possible to calculate the value of time savings resulting from verification for purchases from the business types included in the Ipsos MORI survey. On the basis of the 0.74-minute time saving, each search would generate a $0.20 time saving based on the value of time outlined in section 3.2.1. If a consumer were to search through an average of 4.4 websites and repeat the purchase 12.4 times a year, this would give a value per consumer of $8.80 a year (in 2013 prices). Given the caveats noted above, this figure should be treated with caution but is likely to indicate the overall

[13] Ipsos MORI survey, question 1.
[14] Google (2011), 'Beyond last click: Understanding your consumers' online path to purchase', p. 9.
[15] See, for example, Accenture (2013), 'Accenture Seamless Retail Study', 15 April (available at: http://newsroom.accenture.com/news/accenture-study-shows-us-consumers-want-a-seamless-shopping-experience-across-store-online-and-mobile-that-many-retailers-are-struggling-to-deliver.htm#rel, accessed 16 October 2014).

magnitude of the size of the effect. It is also worth noting that these savings represent the value of the time saved rather than a financial benefit per se.

3.3 Better information about the nature of product/services

Consumers have different preferences for products or experiences and are faced with an array of products or services that vary in their nature. The cost of searching (often hundreds) of listings could prevent a customer from finding the product or provider that best matches their needs. For example, if a consumer visits a restaurant expecting it to be vegetarian and it only serves one vegetarian dish, the restaurant has not matched the consumer's preference for vegetarian food and the consumer is likely to be less than satisfied. Schwartz et al. (1986)[16] discussed a number of ways in which information failures in consumer searches can lead to sub-optimal decisions, specifically in the context of limiting information and choice to prevent 'information overload', and suggested that narrowing choice in the market would be expected to reduce overall welfare. Conversely, this suggests that an increased range of choices should be preferred to a narrow one, even if searching for information carries a cost. However, the literature is not wholly supportive of increased information and choice in all cases, and there is evidence to suggest that, in some situations, it is possible to have 'too much' choice. Iyengar and Lepper (2000)[17] reported experimental results suggesting that consumers could be more likely to make purchases and receive more satisfaction from their decision when presented with fewer options. The researchers suggested that this could be driven by frustration with the decision-making process when many options are presented.

However, there is some evidence of a positive link between decision-making and the availability of information in the context of Google My Business. The Ipsos MORI survey suggested that 79% of respondents agreed that having more business information on the search engine results page would allow them to find a business that better matches what they are looking for.[18] Furthermore, over half of all respondents identified positive reviews as an important factor in selecting somewhere to purchase from.[19]

3.4 Consumer trust

Economic theory linking consumer trust in businesses and macroeconomic outcomes is limited. However, there is literature on the impact of consumer trust on decision-making in the context of e-commerce. Kim et al. (2008)[20] used Internet purchasing data collected by an online survey and a Structural Equation Model approach to estimate the effect of consumer trust, perceived risk and perceived benefit on purchasing intentions and ultimately purchasing decisions. The researchers found that trust could affect purchasing intentions directly and indirectly (by reducing perceptions of risk). The researchers suggested that this highlighted the importance of trust in electronic transactions, which is clearly relevant to businesses listed on Google My Business.

The impact of verification on consumer trust is supported by the Ipsos results. During the SERP test, those who saw complete listings were twice as likely to

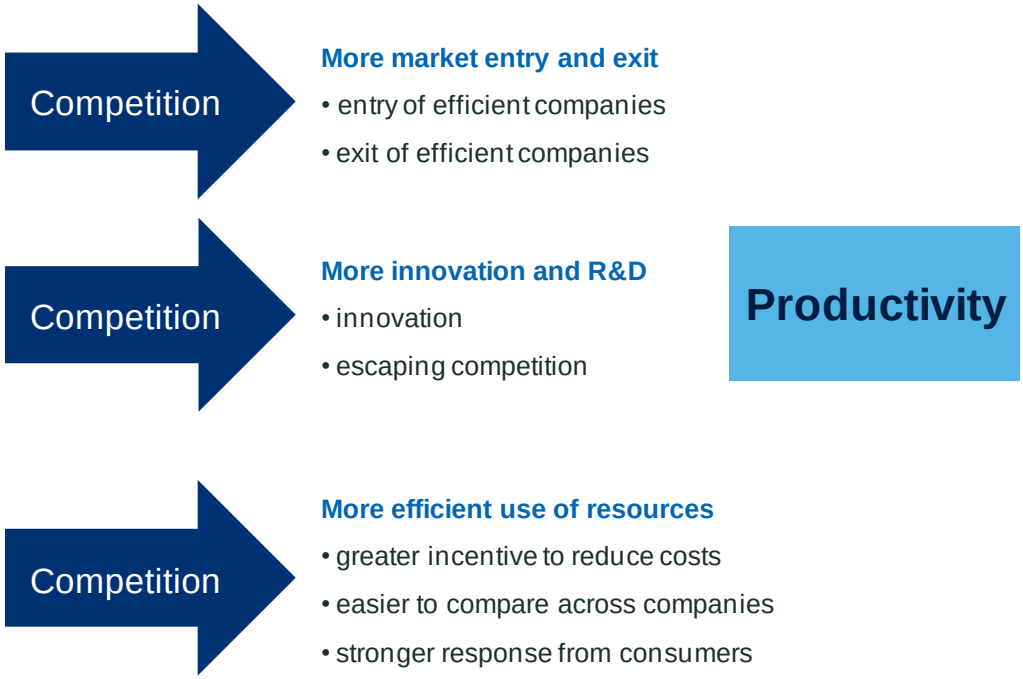
[16] Schwartz, A., Grether, D.M. and Wilde, L.L. (1986), 'The Irrelevance of Information Overload: An Analysis of Search and Disclosure', *Faculty Scholarship Series*, Paper 1123.
[17] Iyengar, S.S. and Lepper, M.R. (2000), 'When Choice is Demotivating: Can One Desire Too Much of a Good Thing?', *Journal of Personality and Social Psychology*, Vol. 79, No. 6, pp. 995–1,006.
[18] Ipsos MORI survey, question 32, part 10.
[19] Ipsos MORI survey, question 3, part 8.
[20] Kim, D.J., Ferrin D.L. and Rao, H.R. (2008), 'A trust-based consumer decision-making model in electronic commerce: The role of trust, perceived risk, and their antecedents', *Decision Support Systems*, 44, pp. 544–64.

say that a business was reliable than those shown the unverified minimal listings of the same business.[21] 69% of respondents shown the complete, verified listings agreed that it was a 'reputable business', compared with 36% agreement from those shown the unverified minimal listings of the same business.[22] In addition, results from the Ipsos MORI survey showed that 67% of total respondents said that they trust a business more if business information is included on the search engine results page,[23] with 71% saying that positive reviews on search engine results would make them more comfortable with using the business.[24] 65% of all respondents said that they would avoid a business with little or no information on the search engine results page.[25]

3.5 Comparing products/services offered or discovering new businesses facilitating competition

There is a significant body of academic literature that links the strength of competition to improved economic outcomes such as more innovative and efficient businesses (broadly characterised as productivity). These in turn lead to higher-quality products and lower prices for consumers. These are grouped into three key channels in a paper by the European Parliament.[26] The channels through which competition can affect productivity are summarised in the figure below, and discussed separately below the figure.

Figure 3.2 Channels through which competition can affect productivity



Source: Oxera, based on European Parliament (2013), 'The Contribution of Competition Policy to Growth and the EU 2020 Strategy', July.

[21] Ipsos MORI survey, question 26, part 2.
[22] Ipsos MORI survey, question 27, part 9.
[23] Ipsos MORI survey, question 32, part 9.
[24] Ipsos MORI survey, question 32, part 4.
[25] Ipsos MORI survey, question 32, part 6.
[26] European Parliament (2013), 'The Contribution of Competition Policy to Growth and the EU 2020 Strategy', July. The European Parliament paper actually identified a fourth channel based on improvements in allocative efficiency. This stems from the idea that in a more competitive market, firms are more responsive to what consumers want. However, the authors did not consider this to be a significant channel for benefits in most developed economies and it is not considered further.

3.5.1 Entry and exit

The concept in this channel is that competitive forces mean that firm performance drives entry and exit in the market. The least efficient firms are unable to produce at the prevailing market price and are forced to exit the market. Conversely, new entrants are only able to enter the market if they are able to produce the good or service at or below the prevailing market price. Over time, only the most efficient firms actually operate. Aghion et al. 2004[27] provided empirical evidence for this concept by studying 'residual' productivity (which is interpreted as technological progress)[28] of UK firms in response to market entry.[29] The results indicated that more entry by foreign firms led to increased productivity by domestic firms. The authors suggested that this could come about as entry or the threat of entry spurs incumbent firms to innovate.

3.5.2 Innovation and R&D

The European Parliament paper argued that in a more competitive market, firms have a strong incentive to innovate and develop new products.[30] This could give a firm a competitive advantage that could increase its profitability and/or its market share, at least temporarily, while its competitors catch up. The converse of this would be a market with just one firm. In this case, Tirole (1988)[31] suggested that the single firm does not have strong enough incentives to undertake innovation because there would be no benefit to competing against its own products. However, incentives to innovate in a competitive environment require the presence of legal institutions (e.g. patent protection) to protect the productive gains from R&D, at least temporarily, in order for innovative firms to recoup the cost of their innovations.

3.5.3 More efficient use of resources

The resource efficiency channel is similar (although distinct from) the entry and exit channel in that it is concerned with the pressure faced by businesses to keep costs down. However, while the entry and exit channel relates to the composition of the industry, the resource efficiency channel describes how existing firms face pressure to keep costs down by making the best use of resources available—e.g. using the most efficient production techniques. Nalebuff and Stiglitz (1983)[32] described one possible effect in detail. The authors described how compensation schemes (e.g. pay or contractor remuneration) based on relative performance could improve incentives for cost savings, distribute risks efficiently (i.e. to those able to influence outcomes) and have built-in flexibility (in the face of uncertain costs).

[27] Aghion P., Blundell R., Griffith R., Howitt P. and Prantl S. (2004), 'Entry and Productivity Growth: Evidence From Micro Level Panel Data', *Journal of the European Economic Association*, April-May, 2(2–3), pp. 265–76.
[28] Total factor productivity (TPF) is the element of productivity that cannot be accounted for by increases in labour or capital inputs. It is sometimes used in economic literature as a proxy for technological growth.
[29] The authors made use of policy reforms in the UK during the 1980s (specifically the EU Single Market Programme), which created new possibilities for market entry that is determined independently of productivity. This addressed the problem created by the fact that potential entrants could have information about productivity developments in advance, which would mean that productivity could also be affecting entry.
[30] European Parliament (2013), 'The Contribution of Competition Policy to Growth and the EU 2020 Strategy', July. p. 17.
[31] Tirole, J. (1988), 'The Theory of Industrial Organization', *MIT Press*, Cambridge, Massachusetts. p. 391.
[32] Nalebuff B.J. and Stiglitz J.E. (1983), 'Information, Competition and Markets', *The American Economic Review,* Vol 73, Issue 2, Papers and Proceedings of the Ninety-Fifth Annual Meeting of the American Economic Association, May.

3.5.4 Evidence of competition impacts from the Ipsos MORI survey

There is some evidence from the Ipsos MORI survey that search engines and map sites/apps help widen the range of businesses that consumers are aware of or would consider purchasing from. However, the responses were not as strong as some of the other benefits described elsewhere in this report. Only 23% of those who used map sites/apps to gather information found that it introduced them to a business/store they did not know about (this is slightly higher than those who used search rather than maps), and only 19% responded that they found a new product through maps/apps.[33] However, while this proportion is relatively small, an explanation might be that only 41% of total respondents reported that they were very interested in trying out businesses that they had not used previously.[34]

Another possible channel for competition benefits comes from ease of comparison. While map/app users were not directly asked about this, the survey results suggest that this is a widespread use for search engines, with 86% of respondents reporting that they used the search information they gathered for product/service comparisons.[35]

[33] Ipsos MORI survey, question 19, part 2.
[34] Ipsos MORI survey, question 2, part 7.
[35] Ipsos MORI survey, question 10, part 12.

4 Business benefits

Our approach to quantifying the business benefits of Google My Business is based on measuring the impact that additional information could have on online user behaviour. Where additional information generates additional website traffic (or footfall to the premises) this may result in additional consumer activity. Specifically, the value of a homepage visit can be proxied using the price that firms are otherwise willing to pay intermediaries for a click-through from an external website.[36]

We have estimated the effect of including information in a Google My Business listing on available online performance metrics. First, we used statistical techniques to compare the performance of listings that contain additional information against those that do not; then, we quantified the value for changes in the performance metric.

The remainder of this section is structured as follows. Sections 4.1 and 4.2 describe the performance data or 'proxies' and the results of analysis of this data. Section 4.3 links this evidence to findings from the Ipsos MORI survey on Google My Business. Section 4.4 combines the activity relationships with values of online click-throughs to provide an estimate of the firm-level benefit.

4.1 Performance indicators and business performance

We were provided with a large dataset of business listings attributes and associated measures of online performance. Further detail of the data and technical methodology are contained in Appendix A1. The performance metrics that are relevant to quantifying Google My Business listings benefits are as follows.

- **Number of direction requests**. It may be reasonable to expect that a higher number of directions to a firm's listed location could result in a greater footfall to a business premises. Obtaining directions reveals a measure of interest and possible intent to purchase. In general, firms with greater footfall would be expected to make a higher number of sales.[37]

- **Number of homepage clicks**. This metric captures the click-through from a Google My Business listing to the firm's website. As with direction requests, this is a signal of a potential intent to purchase; and the online marketing sector serves as reference point. The valuation of clicks is context-specific—e.g. the price per click in 2011 for 'Funeral Flowers Arrangement' was approximately $21, whereas for 'flower delivery' it was approximately $4.[38]

4.2 Relationships between listings attributes and performance variables

We have examined the relationship between the information provided in listings (referred to as listing attributes) and firm-level performance variables. The data and approach are described in further detail in Appendix A1.

[36] Google My Business does not charge listing users for a click-through. However, it is common to have paid clicks in other contexts; therefore traffic generated by Google My Business is a visit that might, alternatively, have been paid for.
[37] Note that it may be possible that the addition of certain information (e.g. a website) could reduce direction requests, without a decline in footfall, if for instance the information allows web users access to the directions via an alternative source.
[38] See http://www.wordstream.com/articles/google-earnings.

When making comparisons across firms, there is a strong association between the provision of listing attributes and the available online performance measures.

Table 4.1 Relationships between attributes and online performance

Attribute	Percentage change associated with each attribute	
	Directions requests (%)	Homepage clicks (%)
Photos	42	35
Phone number	-9	41
Website/URL	58	n/a
Opening hours	13	42
User reviews	144	360

Source: Oxera analysis of Google My Business data.

Our analysis found that all attributes, except the phone number, are associated with a large increase in online performance.[39] As expected, user reviews, which provide third-party credibility and further information about a retailer or service, are associated with large increases in online activity. Having a link to a website attribute is also associated with large differences in activity, with firms that include a URL having 60% more directions requests than those that do not. It is also clear that attributes tend to have a smaller-sized relationship with direction requests, relative to homepage clicks.

There may be good reasons for the phone number attribute having a negative correlation with certain performance measures, but the evidence here does not support any specific mechanism.[40] It should be noted, however, that a reduction in online activity may not necessarily mean a negative impact on firms if there is an 'offline' substitution occurring—i.e. users are using the information to call the listing rather than using online methods of communication.

It is important to be aware that there may be other factors, such as quality of firm management, that are correlated with both making more information available and the performance metrics. Sufficient data was not available to allow for this to be controlled for in this study.

4.3 Survey results and business benefits

The trends evident in the data above show that additional information is associated with increased activity. This finding is supported by the Ipsos MORI survey results. A large proportion of survey respondents identified that opening hours and user reviews were important in searching for a business. When choosing a business, respondents also identified opening hours as being important, as shown in Table 4.2.

[39] It is important to be aware that these results are not necessarily indicative of a causal relationship.
[40] For example, if a phone number is provided, a consumer may prefer to call the listed firm rather than clicking through to its website or asking for directions.

Table 4.2 Survey results, factors consumers identify as important for search and selection of firms

	Percentage of respondents stating attribute as a factor when searching for a business	Percentage of respondents stating attribute as a factor when choosing a business
Photos	15%	N/A
Phone number	36%	N/A
Website/URL	N/A	N/A
Opening hours	52%	48%
User reviews	45%	19%

Source: Ipsos MORI (2014), 'Impact of Search Listings for Local Businesses', August.

The results from the SERP test (see Table 4.3) also show that users who see more information in a listing are significantly more likely to state that they would visit a firm and consider purchasing from the firm.

Table 4.3 Survey results of SERP test, actions after seeing complete and incomplete listings

Likely actions after seeing search results	Standard listing (control group)	Verified listing (treatment group)
Click through to visit the business's website	49%	50%
Visit the business	31%	40%*
Click to get driving directions	36%	38%
Consider purchasing from this business	28%	37%*
Search for more information about this business	40%	35%*

Note: * indicates that the result is statistically different from the control group at 5%.

Source: IPSOS GYBO survey results.

Importantly, the results indicate that users who view more complete listings are about 30% more likely to report an intention to visit a store or purchase from it. These findings are consistent with the results from the performance data, assuming that a direction request is also an indication of an intention to visit a store.[41] Elsewhere in the Ipsos MORI survey, we find that photos, reviews and opening hours all have a large, positive relationship with consumer engagement.[42]

4.4 Calculating the business benefits of listing

Using these findings, we have calculated an estimate of the financial benefit to a small to medium-sized firm. These types of firms are particularly relevant in the context of community-level impacts, given their typical scope of activity and prevalence. Our estimate is based on an average firm (that does not have a complete listing) receiving additional website traffic that it might otherwise have had to pay for. To estimate the increase in web traffic, we used the smallest relationship for homepage clicks (see Table 4.1)—i.e. the photos attribute.

[41] The levels and impact sizes between the survey result and econometric model are not directly comparable; however, the findings support the direction of the relationship.
[42] Interestingly, we also found that the phone number is associated with a slight decline in engagement, which would support some of the patterns in the econometric results.

We have used publicly available data to provide two separate assumptions on how much companies paid for an advertising-based click-through. Oxera notes that the first source of the value of a click, Hochman (2013), is derived from a dataset from 50 advertisers that includes prices paid for search-based advertising as well as display advertising. [43]

It is probable that search activity exhibits a greater degree of intent to purchase than simply viewing a display advert.[44] Therefore, the inclusion of display revenue in the pay-per-click estimate may bias the value relative to the more search-oriented nature of Google My Business. The source also includes some data from businesses with relatively large advertising spend, which may not be reflective of all listed businesses. To ensure that this point estimate is conservative, we have deliberately taken the price value at the lower end of the spread of prices over time. We note that relative to the more context-specific click valuations discussed in section 4.1, the $0.62 per click appears significantly smaller.

The second source, Wordstream (2012), provides a cost-per-click valuation on Google search results, separately from display advertising, which may be more relevant in the context of business listings.[45] Oxera also understands that it is derived from a larger, more representative dataset than Hochman (2013). This source produces a cost-per-click value for search of $0.53. However, this source appears to be drawn from a single time period (2012 Q3). Relative to the previous quarter, 2012 Q3 had a 16.5% fall in average cost-per-click, which would make the 2012 Q2 valuation approximately $0.63. This would be consistent with the Hochman (2013) estimate of cost-per-click.[46] It is possible that this particular period is affected by a specific shock or event that temporarily depressed prices.

The sources described above are illustrative of the difficulty involved in obtaining robust and relevant estimates of the monetary value of user clicks. Given the inherent uncertainty in deriving an industry wide shadow price for additional clicks, Oxera has estimated the benefits based on both figures.

The process for calculating the estimate is shown in Table 4.4.

Table 4.4 Business benefits of complete listings

Calculation step	Unit	Value	Source
Unconditional average firm's click-throughs from Google My Business to website	Clicks per week	22	Average derived from Google My Business data
Average number of clicks associated with complete listings	Clicks per week	30	35% increase. Based on smallest finding from econometric analysis. Derived from results in section 4.1
Average difference in click-throughs for between firms that have complete and incomplete information	Clicks per week	8	
Value of a click to firm (Hochman)	$	0.62	25th percentile of annual average cost per click*

[43] Hochman (2013), 'The Cost Of Pay-Per-Click (Ppc) Advertising—Trends And Analysis', research note (available at: https://www.hochmanconsultants.com/articles/je-hochman-benchmark.shtml).
[44] There is evidence that cost-per-clicks are higher for search than display. See Wordstream (2012).
[45] Wordstream (2012), '24 Hours in the Google Economy', Infographic, available from http:// http://www.smartinsights.com/paid-search-marketing-ppc/paid-search-display-network/google-adwords-conversion-rate-averages-by-industry-infographic/
[46] The annualised rate of change in CPC in Hochman (2013) from 2010 to 2013 was -9.5%,

Value of a click to firm (Wordstream)	$	0.53	Wordstream (2012)**
Value of firm-level benefit over one year (high)	**$**	**248**	
Value of firm-level benefit over one year (low)	**$**	**212**	

Note: * See Hochman (2013), 'The Cost Of Pay-Per-Click (Ppc) Advertising—Trends And Analysis', research note (available at: https://www.hochmanconsultants.com/articles/je-hochman-benchmark.shtml). ** See Wordstream (2012), '24 Hours in the Google Economy', Infographic, available from http:// http://www.smartinsights.com/paid-search-marketing-ppc/paid-search-display-network/google-adwords-conversion-rate-averages-by-industry-infographic/

Source: Ipsos MORI (2014), 'Impact of Search Listings for Local Businesses', August.

The $248 figure represents the annual amount a firm would have had to pay in advertising to acquire the amount of additional click-throughs associated with providing complete information, assuming a cost-per-click of $0.62. Further benefits could exist (such as increased revenue per unit, wider markets and more satisfied consumers), but these cannot easily be quantified. To the extent that advertising or customer acquisition costs yield a positive return on investment, it can be concluded that the benefit would be at least as much as a firm would pay for equivalent additional click-throughs.[47]

[47] In particular, Varian (2009) has found that the "total value enjoyed by advertisers is between 2 and 2.3 times their total expenditure". See Varian (2009), 'Online Ad Auctions', American Economic Review: Papers & Proceedings, Vol. 99, No. 2, pp. 430-434. Hal Varian is Chief Economist at Google.

5 Aggregation of benefits to specific communities

Google's research question seeks to quantify the benefit of complete business listings at the community level. This section aggregates the identified economic effects into community-level impacts. We explain the communities chosen, the method of aggregation, and the interpretation of the quantification.

5.1 Communities chosen

The effects have been quantified across the following metropolitan areas, spanning different regions of the USA and a range of city sizes, as listed in Table 5.1.

Table 5.1 Cities chosen for impact aggregation

City	State	Region	Population
Detroit	Michigan	Midwest	688,701
Atlanta	Georgia	South	447,841
Houston	Texas	South	2,195,914
Colorado Springs	Colorado	West	439,886
Salt Lake City	Utah	West	191,180
Boston	Massachusetts	Northeast	645,966
Phoenix	Arizona	Southwest	1,513,367
Olympia	Washington	Pacific Northwest	48,338
Cedar Falls	Iowa	Midwest	40,566
Hendersonville	Tennessee	South	54,068

Source: United States Census Bureau, Population Division (2014), 'Annual Estimates of the Resident Population for Incorporated Places of 50,000 or More, Ranked by July 1, 2013 Population: April 1, 2010 to July 1, 2013', May.

There is a considerable variation in Internet connectivity and online habits across the USA. For instance, individuals in California are more likely than individuals in other states to be able to access the Internet from multiple devices when away from home.[48] While a range of sizes and regions has been chosen, the omission of certain cities such as Los Angeles or New York might mean the effects are representative of those metropolitan areas only and not the wider USA.

5.2 Approach to aggregating consumer-level benefits

We have calculated consumer-level benefits by aggregating the time savings identified in section 3.2.1 to the selection of cities. Since this approach does not capture other effects such as competition or consumer trust it is likely that our estimation is conservative.

The aggregation scales the impact according to the demographics of the survey results. The IPSOS Mori survey suggests that some 47% of 18–64-year-olds use search to find information about businesses they are interested in. It is possible that the number of consumers using either search or maps is higher. However, the IPSOS Mori survey allowed respondents to report multiple responses; therefore, summing the maps and search users is likely to result in some double-counting. It is possible to use US Census data on population to estimate the number of potential beneficiaries. Although we have not been able to find data on population by age range at the same level of spatial area, it is possible to estimate this by calculating the share of the population in each county made up

[48] United States Census Bureau (2013), 'Computer and Internet Use in the United States', report, May.

of 18–64-year-olds. This proportion is then multiplied by the population of the city, on the assumption that the demographics of the county should be similar to those of these cities.

The benefits per user identified in Section 3.2 are then grossed up to reflect the total population of the city for the relevant age group, excluding those who do not use search. The results are presented in Table 5.2. Since the IPSOS Mori survey did not cover different cities, the consumer benefits are largely reflective of the size of the city, with relatively small variations based on demographics. As a result, we would recommend treating these results as being illustrative of the scale of benefits from listing information.

Table 5.2 Consumer benefits for selected cities

City	State	Region	Population	Population aged 18–64	Community benefit ($)
Detroit	Michigan	Midwest	688,701	410,398	1,703,179
Atlanta	Georgia	South	447,841	283,753	1,177,595
Houston	Texas	South	2,195,914	1,340,189	5,561,880
Colorado Springs	Colorado	West	439,886	266,969	1,107,942
Salt Lake City	Utah	West	191,180	113,928	472,808
Boston	Massachusetts	North-east	645,966	436,817	1,812,820
Phoenix	Arizona	South-west	1,513,367	887,087	3,681,473
Olympia	Washington	Pacific North-west	48,338	29,383	121,940
Cedar Falls	Iowa	Midwest	40,566	24,455	101,490
Hendersonville	Tennessee	South	54,068	31,918	132,462

Sources: United States Census Bureau, IPSOS Mori, and Oxera calculations.

5.3 Approach to aggregating business benefits

For business effects, our approach first identifies the listings that are incomplete from Google's complete dataset for the entire USA. We consider any listing that does not contain photos, phone number or opening hours as incomplete. As explained in section 4.4, we use a conservative estimate from the evidence that the difference in homepage traffic associated with providing complete information would be 35%. This is multiplied by the seven-day average of homepage clicks for incomplete listings to obtain the expected change in clicks.[49] For each listing, we obtain the value of this potential difference in traffic by multiplying the change in clicks by the value of a click ($0.62, as per section 4.4). Finally, we sum the total value across the communities chosen, over a whole year. For completeness, the benefits have also been calculated on the basis of the $0.53 cost-per-click valuation. These results are shown in Appendix A1.3.

We were able to identify business listings in specific communities, since Google had provided the firm-level listing database with US state and city identifiers. The raw Google dataset did not contain a uniform coding of state and city names,[50] and the presence of spelling errors in the city variable of the dataset might also

[49] The method takes the listing status and homepage traffic from 24 June 2014 and thereafter respectively.
[50] For instance in the city field, Phoenix could be coded as 'Phoenix', 'Phoenix,' or 'Phoenix, AZ'.

lead to a misallocation of business listings. To deal with these issues, we performed a simple word search on the city variable, conditional on the known state of each supplied community.[51]

This method assumes that the data supplied by Google is an accurate reflection of actual business establishments. The presence of 'dead' listings that refer to ceased or relocated businesses could inflate the estimate; other coding errors (e.g. state or city naming not deal with above) could erroneously apportion the value of generated clicks. Where we found that the number of Google My Business listings exceeded the number of establishments in the US Census data, we scaled the value of the impact to the known level of places, as shown in Table 5.3. This adjustment is conservative with respect to the impact assessment, as we understand that the US Census data does not include very small businesses.

Table 5.3 Calculation of scaling to account for potentially spurious listings

	Total Google My Business listings	Total number of firms	Total number of establishments	Listings as a proportion of establishments	Listings proportion of firms	Scale factor
Atlanta	60,261	102,462	128,050	47%	59%	1.00
Boston	65,021	98,935	121,796	53%	66%	1.00
Cedar falls	1,981					1.00
Colorado Springs	29,403	13,925	16,427	179%	211%	0.56
Detroit	31,129	78,677	96,919	32%	40%	1.00
Hendersonville	3,073					1.00
Houston	174,211	97,876	123,784	141%	178%	0.71
Olympia	8,963	5,173	5,733	156%	173%	0.64
Phoenix	84,575	67,645	86,667	98%	125%	1.00
Salt Lake City	21,495	26,331	31,390	68%	82%	1.00

Source: Oxera analysis of Google data, United States Census Bureau, Statistics of Businesses.

For two locations, the United States Census Bureau does not record business statistics at the level required to estimate a scaling factor. For these cities, we have assumed no scaling.

The estimated benefits accruing to business are listed in Table 5.4 below.

[51] In addition, this identifies and recodes communities in the cities of interest—i.e. Cedar Falls in Iowa is distinct from Cedar Falls in Wisconsin.

Table 5.4 Business impact of complete information for selected cities

	Total incomplete Google My Business listings	Total homepage clicks associated with incomplete Google My Business listings	Total weekly clicks associated with complete information	Value of generated clicks, scaled to known number of establishments ($ per year)	Value of generated clicks, per resident ($ per year)
Atlanta	55,045	421,115	147,390	4,751,862	10.61
Boston	61,087	457,004	159,951	5,156,834	7.98
Cedar falls	1,785	17,242	6,035	194,559	4.80
Colorado Springs	26,179	157,842	55,245	995,067	2.26
Detroit	29,880	120,126	42,044	1,355,502	1.97
Hendersonville	2,701	14,536	5,088	164,024	3.03
Houston	158,926	908,420	317,947	7,283,476	3.32
Olympia	8,170	44,051	15,418	317,942	6.58
Phoenix	76,281	361,965	126,688	4,084,413	2.70
Salt Lake City	19,416	133,458	46,710	1,505,940	7.88

Source: Oxera analysis of Google data.

Larger cities such as Atlanta and Boston benefit more in gross terms than smaller cities as a result of having more listings. However, on a per capita level, Salt Lake City and Olympia generate similar levels of impact ($7–$8 per head compared with $8–$10 for Atlanta and Boston). Given that the proportion of incomplete (vs complete) listings is relatively stable across the cities, at around 90%, the main driver of the results is the underlying levels of homepage traffic in each state. Note as well that the effects presented here represent the annual saving for firms in the costs of traffic acquisition only. Further benefits in terms of increased sales could also occur.

6 Conclusions

The evidence from the Ipsos MORI survey suggests that there are benefits from verification and additional information in business listings in the Google My Business directory. We estimate that that there could be time savings of around $9 a year per user when purchasing from one of the five sectors included in the survey. Other responses indicate that consumers also benefit from increased trust in verified businesses, improved matching of businesses to their purchasing needs, the ability to compare businesses and (to a lesser extent) finding new businesses. Economic theory suggests that these benefits can be linked to improved economic outcomes (both financial and non-financial).

The evidence from the firm-level analysis shows a positive correlation between additional information and measures of online activity. The Ipsos MORI results support this finding, with listing information having a positive effect on firm selection and consumer intentions. Our estimate suggests that the firm-specific benefits for small to medium-sized businesses could be between $212 and $250 per year.

Oxera has also calculated the implied consumer time savings and the value to businesses in selected cities. The benefits vary significantly, driven by both the size of the city (larger cities have more businesses and therefore a larger number of incomplete listings) but also by Internet activity. The estimates suggest that the cities which could benefit most from listings being completed are those where there are large numbers of businesses with incomplete listings and where Internet use is greatest; creating a demand and supply gap for business listing information.

We note that other benefits of this traffic (i.e. increased sales, brand recognition) have not been quantified, but could increase this value. Furthermore, the additional information could drive impacts via other channels (i.e. firm competitiveness) that could further benefit vibrant and fast-growing communities.

A1 Business benefits data appendix

A1.1 Data

A1.1.1 Description and structure

Google provided an extract of its Google My Business listing database, organised at the individual listing of 'place' level, across two points in time. For confidentiality and data protection reasons, we were not given access to the name of the firm of each business listing, its precise location, or any sensitive financial or personal data. However, the listing database includes variables describing the US state and city. In addition, two variables provide high- and low-level categorisation of the listings into business sectors.

For each period and each firm, the dataset records the presence of the following attributes, as binary (present or not present) variables:

- photos;
- phone number;
- website link;
- opening hours;
- user reviews.

Since this information is tracked at the listing level, it is possible to track which firms add (or remove) information over time. In addition, the data contains a variable indicating whether the listing is verified.[52]

The performance metrics supplied for each period at each point in time are seven-day averages of daily activity of the following variables.

- **Homepage clicks**. This metric captures the number of times a web user clicks on the supplied website link from the Google My Business listing and navigates to the chosen website.
- **Direction requests**. This metric records the number of times that directions are requested to the associated geographic location via Google Maps.

Other information may be available on the Google My Business platform. Following discussion with Google staff, the information was supplied on the basis of relevance to the problem and what was most practicable in terms of extraction.

A1.1.2 Scope and coverage

We understand that the data supplied is the entire population of Google My Business listings for the USA. The raw data as supplied contains 16,838,601 observations corresponding to distinct listings. This compares with about 7.3m establishments as recorded by the United States Census Bureau business statistics.[53] It should be noted that the census data is gathered on the basis of certain business registration and business employment criteria, and is likely to omit many small listings and listings not classified as businesses.

[52] Due to data limitations, it is not possible to track this variable over the time period of interest.
[53] United States Census Bureau (2013), 'Statistics of U.S. Businesses', 2011 annual data, retrieved 28 August 2014, from http://www2.census.gov/econ/susb/data/2011/us_state_totals_2011.xls.

The data as supplied covers listings from 4,042 distinct listing categories. These are further grouped into one of seven broad categories.

We understand that the data supplied for the first period corresponds to the listing attributes on 17 June 2014, while the second period corresponds to the listing attributes on 24 June 2014. The performance data represents a seven-day average of the daily volume following these two dates.[54]

A1.1.3 Data issues and cleaning

On receiving the data, we reviewed the contents and structure to ensure that it contained valid and accurate data for this research. We discovered the following issues.

- **Non-US listings**. A proportion of entries supplied were associated with countries other than the USA. Since the study aims to obtain an effect and impact for the USA, these have been omitted—we filtered out entries that did not conform to a US state or territory name or abbreviation.
- **Coding of performance variables**. The performance metrics such as homepage clicks can be coded as '0' even if the attributes indicate that no website is listed. This could bias the results of a study, since it is not possible for certain attributes (e.g. phone number) to influence homepage clicks if a homepage is not supplied in the Google My Business listing. We recoded these entries as 'missing' so that they were automatically excluded from models that examine the effect on homepage clicks.
- **Selection of listings that change**. A small proportion of the raw data contains observations that change their listing.[55] It is possible that a bias could exist between this group and the remainder of the firms which can be used as a control group.[56] To guard against this, we identified a set of observations in the control group (the firms that do not change) which match some of the distributional characteristics of the group of firms that *do* change. This was constructed to retain as many observations as possible, at the expense of excluding some sectors which have very few observations that change.

A1.1.4 Summary statistics

We prepared some summary statistics of the dataset (after cleaning) to further understand the data. Table A1.1 below shows a breakdown of business listings by attribute.

[54] For example, the first period captures the seven-day performance from 18 June 2014 to 24 June 2014; and for the second period it is from 25 June 2014 up to 1 July 2014.
[55] Of the raw data, 10,807 listings (0.06%) change in some way.
[56] For instance, the distribution of firm sectors could be different, which could drive the results.

Table A1.1 Summary statistics of business listing attributes

Attribute	Observations	Percentage
With photos	2,031,694	12.1%
Without photos	14,799,282	87.9%
With phone number	15,914,215	94.6%
Without phone number	916,761	5.4%
With website link	6,693,872	39.8%
Without website link	10,137,104	60.2%
With opening hours	3,211,898	19.1%
Without opening hours	13,619,078	80.9%
With user reviews	328,243	2.0%
Without user reviews	16,502,733	98.0%
Total	**16,830,976**	

Note: Statistics refer to attributes in the first time period.

Source: Oxera analysis of Google My Business data.

Across the attributes there are considerable differences, with almost 95% of listings providing the phone number, yet only 2% providing user reviews. The low uptake of listings with reviews may be due to the fact that this feature is relatively new, being added in November 2013.[57]

Some of the distributional properties of the performance variables are shown in Table A1.2.

Table A1.2 Summary statistics of performance variables

Statistic	Directions requests		Homepage clicks	
	1st period	2nd period	1st period	2nd period
Minimum	0	0	0	0
Median	0	0	3	3
Mean	2.41	2.38	22.08	22.00
Maximum	139,646	135,532	128,806	111,632
Standard deviation	79.14	77.69	210.26	208.64
No. observations	14,792,598	14,782,709	6,533,984	6,539,088

Source: Oxera analysis of Google My Business data.

First, there appears to be a wide spread or variation in each of the performance indicators, with a large difference between the mean and maximum values. Given the diversity of the types of firms and organisations that list, it is likely that much of this variation is driven by firm-specific variation not captured in this data. While the sector or sub-sector categories may explain some of this, the size (e.g. revenue, employees), business model and skill of the management are all potential unobserved drivers of performance variation.

Second, the distributions of all the metrics of activity appear to be skewed. The median (identifying the middle listing) level of activity on each is either zero or very small. This implies that for the time frame chosen, around 50% (and

[57] See http://googleandyourbusiness.blogspot.co.uk/2013/11/announcing-reviews-in-google-places-for.html.

possibly more) of the listings had zero or negligible levels of direction requests and homepage clicks. While it is likely that many smaller firms or organisations had no traffic at all, it is unclear whether this is a normal pattern of usage or whether a different window would reveal more activity.

A1.2 Statistical approach

The approach compares the level of performance of a given metric for listings that contain attributes (such as a phone number) against those listings that do not. This is called a cross-sectional regression approach.[58] The technique of multiple regression allows simultaneous exploration of the correlations between the presence of multiple listing attributes and a performance measure. This could be for multiple effects such as a combination of listing attributes, but also other factors such as location or industry that may affect the level of performance.

The statistical model can be expressed using the following formula:

$$Y_{it} = \alpha + \beta X_{it} + \delta I_i + \gamma S_i + e_{it}$$

The model identifies the correlations between the level of activity Y_{it} and the matrix of listing attributes X_{it} where the coefficient β is the parameter of interest. Also included are vertical sector dummies I_i, which control for a fixed level of difference in performance across the seven industry groupings. State-level controls, S_i, are also included, as there may be reasons for specific states to have a greater volume of traffic due to the nature of industry structure or for institutional reasons. A disturbance term, e_{it}, contains the unexplained variation not captured by these factors.[59] The α term captures the model constant, or the level of activity absent any other attributes, in a chosen base sector and state.

We have estimated the model with an ordinary least squares linear regression technique that estimates the relationship between attributes and performance conditioned at the mean level of performance.[60]

A1.3 Aggregated business benefits with alternative cost-per-click assumption

Oxera has calculated the aggregated business benefits as in Table 5.4 using the Wordstream (2012) value for cost-per-click of $0.53. The preceding steps of aggregating clicks and scaling to the number of known establishments are done in the same manner. The effect of this change is to uniformly reduce the size of the impact across the communities in proportion to the change in value. The results are shown below in Table A1.3.

[58] Note that, in principle, it may be possible to compare firm listings over time. This is called a difference-in-difference approach. We found that this approach was not feasible due to data structure limitations. Note also that a cross-sectional approach is not robust to potential selection bias—i.e. other factors may be driving both the completeness of information and online performance.

[59] Ideally, a model would explain most of the variation in performance. In this case, the data does not include other firm-specific information (size, revenue, business model, skill of management) that may all explain variation in activity.

[60] Note that other techniques, such as quantile regression, may be available to explore the effect at other levels of performance and to examine distributional effects.

Table A1.3 Business impact of complete information for selected cities, alternative click valuation

	Total incomplete Google My Business listings	Total homepage clicks associated with incomplete Google My Business listings	Total weekly clicks associated with complete information	Value of generated clicks, scaled to known number of establishments ($ per year)	Value of generated clicks, per resident ($ per year)
Atlanta	55,045	421,115	147,390	4,062,075	9.07
Boston	61,087	457,004	159,951	4,408,261	6.82
Cedar falls	1,785	17,242	6,035	166,316	4.10
Colorado Springs	26,179	157,842	55,245	850,622	1.93
Detroit	29,880	120,126	42,044	1,158,736	1.68
Hendersonville	2,701	14,536	5,088	140,214	2.59
Houston	158,926	908,420	317,947	6,226,197	2.84
Olympia	8,170	44,051	15,418	271,789	5.62
Phoenix	76,281	361,965	126,688	3,491,515	2.31
Salt Lake City	19,416	133,458	46,710	1,287,336	6.73

Source: Oxera analysis of Google data.

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