

The economic impact of online payments
Breaking barriers across Europe



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1. Executive summary

Online payments play a critical role in the continued growth and development of the European economy. They harness the internet's potential as a trade platform, stimulating competition and economic growth.

The industry operates behind the scenes to allow trade to occur conveniently and efficiently over the internet.

Across the EU27 the economic impact of online payments is estimated to contribute €125 billion to GDP in 2012. Through their catalyst role in enabling online retail, they:

- Drive incremental sales by enabling lower prices, and increased access to and choice of goods. Over two in three online shoppers identify lower prices as their primary reason for shopping over the internet, while one in five note that they can only find certain products online.
- Support the expansion of cross border trade. One in five euros spent online already crosses national borders. Alternative and increasingly interoperable online payment systems are helping overcome remaining barriers to cross border trade in Europe, which result from preferences for different payment methods across countries. The benefits of cross border trade are well documented and define the drive for a Single European Market.
- Assist Small and Medium Enterprises (SMEs) to enter the market. SMEs are crucial for innovation and employment and are at the centre of the European economic growth agenda. Alternative payment systems have emerged as a solution for SMEs that struggle to gain access to more traditional online payments. Three in five euros of transaction value through alternative payment methods are SME trade, nearly double the level of SME transaction value across all online activity.
- Enable €6.6 billion of economic impact through the direct, indirect and induced contribution from industry players. This includes wages paid, taxes contributed and returns generated by online payment industry players, their use of intermediate suppliers and the induced economic impact as these direct and indirect effects flow through the economy.
- Have enabled a new world of digital trade, created efficiencies within the supply chain, supported investment in associated infrastructure such as information and communication technology (ICT), and supported the creation of valuable price, transactional and customer behaviour data. eGovernment opportunities from the use of online payment methods are also generating new benefits for the public sector and the wider economy.

As online payments continue to enter offline stores, the boundaries between online and offline transactions are blurring, driving online competition further into the offline world.

2. Introduction

“Safe and efficient payment systems are essential to the working of financial markets and the economy more generally.”

Oversight of Payment Systems, Bank of England, 2010

The ability to make a payment is a critical factor enabling trade in the modern economy.

Payment systems have evolved over time to respond to people’s desire to transact in larger volumes, with greater efficiency, and across national borders; whilst the online payments industry emerged in order to provide more efficient banking solutions and to unlock the potential for internet based trade.

Online payments for e-commerce activities, ranging from traditional card payments or bank transfers to innovative methods that leverage off existing payment channels and mobile technology such as PayPal and Google’s mobile wallets are expanding across the world. Alternative online payments already account for over 20% of online transactions in the EU27.¹

Today, innovative online payments are breaking the boundaries of the online world to enter bricks and mortar stores. Technology, such as mobile wallets, allows consumers to purchase goods at the click of a button from an online or offline store. The implications of this are only just beginning to be realised.

Like many enabling technologies such as telephone networks, gas pipelines and water systems, payments add immense value, but are often overlooked among the broader effects they enable. These systems usually work in the background to allow the smooth running of our everyday lives.

This study illustrates the impact of online payment systems, defined as any electronic payment method that supports an online transaction, across the EU27.² This is done through:

- A statistical analysis of the overall economic impact of online retail enabled by online payments; and
- Illustration of different transmission mechanisms through which online retail transactions, enabled by online payments, lead to economic impact.

1 Alternative online payments for the purpose of this study refer to online payments excluding direct online bank, card and paper based methods. Deloitte analysis based on a consumer payment preference survey. ‘Consumer market study on the functioning of e-commerce and internet marketing and selling techniques in the retail of goods’, Civic Consulting prepared for the EC, 2011.

2 For the purposes of this report an online transaction excludes machine to machine transactions or similar related activities.



3. Online payments enable economic growth

“Taking advantage of technological developments, a number of new payment initiation methods have emerged, using the internet, mobile networks and other information and communication technologies. These offer efficient means of electronically initiating and confirming payments that meet consumers’ needs.”

The Payment System, European Central Bank, 2010

The advent of internet based commerce has given firms considerable opportunities to expand their customer base, enter new product markets and rationalise their business. The ability to trade online has in turn been a significant driver of the growth of the internet.

By enabling online trade, online payments have helped unlock the benefits of expanded demand through lower prices, greater choice and convenience, and market efficiency through cross-border trade and smaller firm participation in the economy.

Online payments also facilitate other effects across the economy including increased productivity through better supply chain management, the adoption of ICT and increased competition.

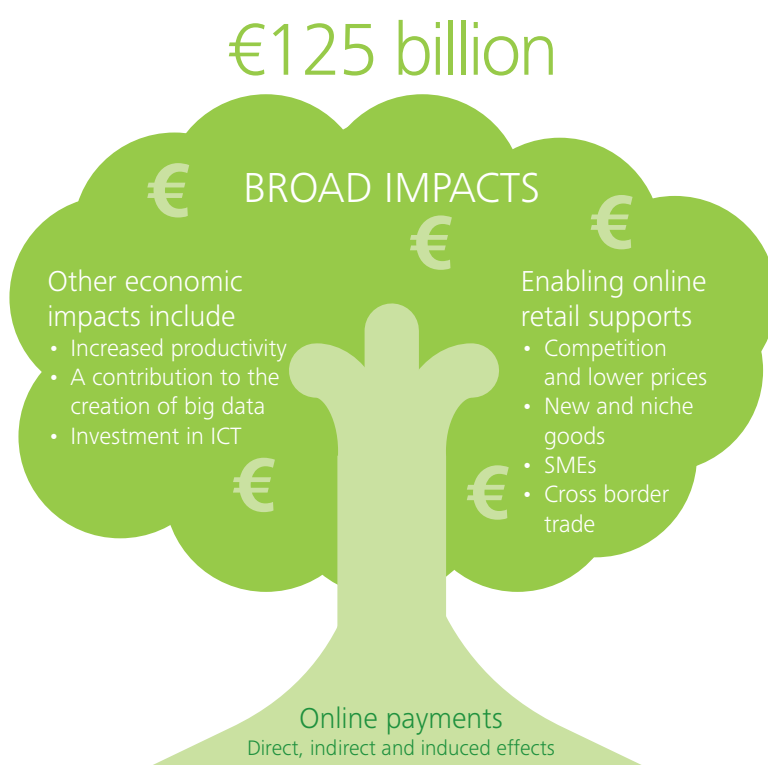
As a result of this catalyst role, the online payments industry has broad effects on the economy that are much larger than the narrow economic contribution of its industry players.

In order to quantify this overall economic impact, a model was constructed of 17 European countries over 5 years in order to identify the main drivers of GDP and isolate the effect of online retail, enabled by online payments. Appendix A.1 describes the methodology in detail.

The results of this model suggest that the total contribution of online retail enabled by online payments within the EU27 is at least 1% of EU27 GDP, or €125 billion in 2012.³

In the absence of online payments, it is unlikely that non-electronic payments would be able to support the scale of economic impact that online payments drive through the internet.⁴

In order to validate this GDP impact, the next three chapters identify the main ways (or transmission mechanisms) in which online payments impact upon the European economy.



3 This is estimated from the econometric results which show that a 1% change in online retail leads to a 0.01% change in GDP per capita.

4 Whilst non-electronic payments are estimated to support approximately 1 in 10 online transactions, a European Central Bank (ECB) study estimates that cash payments across the EU27 account for c.60% of transaction volume, but only c.2% of value. Source: The Social and Private Costs of Retail Payment Instruments, ECB, September 2012.

4. Online payments enable retail e-commerce

“Consumers have everything to gain from the Internet. It expands the size of the market they operate in and gives them access to more providers and more choice. It makes it possible to compare products, suppliers and prices on an unprecedented scale. Internet use for retail shopping is destined to become pervasive. Already 150 million consumers shop online, although only 30 million shop online cross border. We must see to it that adoption of the internet platform will not be unnecessarily slowed down by a failure to remove important regulatory barriers or to address important trust issues for consumers.”

Meglana Kuneva, ex-EU Commissioner⁵

Over the last decade online payment systems have allowed retailers to expand onto the internet, and given new online-only enterprises the chance to emerge.

Retailers previously constrained to selling only in local markets were given the ability to sell goods and services to a much wider customer base of internet users across the globe.

This in turn has promoted competition and efficiency, lower prices and increased choice. By enabling online retail, online payments have generated incremental sales, stimulated by the lower cost of goods online, the greater variety and new types of goods available such as digital goods, or the convenience of being able to transact 24/7 and from a range of locations.

Top reasons frequent online shoppers choose to shop online. Based on consumer survey within the EC study



⁵ Statement made by Commissioner Kuneva in 2009. The number of online shoppers has increased over time. Eurostat figures show that 37% of people in the EU27 were online shoppers in 2009 growing to 45% in 2012.

4.1. Enabling online trade: supporting competition and lower prices

Across the EU27 two in three frequent online shoppers identify lower prices as one of their top three reasons for buying online, according to a study commissioned by the European Commission (hereafter “the EC study”).⁶ The same study found that prices were lower online than offline in thirteen out of the fifteen categories studied, with prices being on average approximately 21% lower online when taking account of products available on the internet across the EU27.

Lower prices drive incremental sales as more price sensitive consumers are able to buy products that they were not willing or able to buy at higher prices.

Drawing on the EC study, the reduction in sales which would occur if online goods had only been available at offline prices is estimated at €23 billion across the EU27 in 2012.⁷

The impact of the internet on price competition, expanded sales and market efficiency is likely to be greater than this estimate, as the competitive pressure from the internet spills over into the offline world. Emerging technologies such as mobile wallets are accelerating this trend (as illustrated in the case study below).

Mobile wallets: Removing the boundaries between the online and offline transactions

Mobile wallets are widely expected to become the next breakthrough in online payment technology. Driven from the alternative online payments industry, they allow users to pay for goods found online or offline using a single online payment solution. They give consumers the ability to walk into a store, scan an item’s barcode into their phone and use this information to either find and buy goods online or pay for them directly to avoid queuing at checkout.

As this fledgling technology evolves, it will allow users to find and purchase goods online from within offline stores using their mobile phones, or to make online payments for offline goods to improve the transaction process. This means competition effects are likely to continue to converge between online and physical channels, as stores are increasingly forced to adopt a multi-channel approach to retail.



⁶ Consumer market study on the functioning of e-commerce and internet marketing and selling techniques in the retail of goods, Civic Consulting prepared for the EC, 2011.

⁷ This assumes that 18% of online trade is cross-border and hence will benefit from price differentials in the EU beyond national boundaries. Source: What does economic research tell us about cross-border e-commerce in the EU digital single market, European Commission, Digital Economy Working Paper 2013/05. These sales uplifted effects are driven from a range of categories with higher price differentials such as toys and games in the UK, DIY and gardening in France and Germany, beauty and personal care in Poland and clothing and footwear in Italy.

4.2. Enabling online trade: opening opportunities for new and niche products

Internet trade, enabled by online payments, gives retailers the chance to offer a wider variety of products and services. This includes products that may not be available offline, for example digital goods such as mobile applications and online gaming, on which EU27 consumers already spend over €700 million per annum.⁸

Online trade also allows niche goods a place in the market as they can appeal to a wider audience. It is estimated that on average an online shop offers 2.5 times the number of products available in a large offline retailer in the same country.⁹

Turning to consumers, the internet allows those who were previously restricted by the availability of goods in their local market, for example those in smaller towns or remote areas, access to a wider range of goods.

One in five frequent online shoppers identify the fact that they “*can only find certain products online*” as one of the three most important reasons why they buy online, and a further one in five mention the fact that “*there is more choice online*”.¹⁰

This increased product choice, availability and accessibility drives a proportion of incremental sales, some of which will be supported by incremental consumer spending.

The EC study estimates that 30% of online sales can be attributed to online products which are not available offline across the EU27.¹¹ This implies a value of sales of goods available online which are not available offline of €33 billion¹² across the EU27. The largest differentials in products available online relative to offline exist in France, the Netherlands and Belgium.

Digital goods/apps: online payments through mobile apps

The development of mobile apps has sparked a new wave of digital innovation and allowed many SMEs to enter the market selling different types of niche digital goods. There are a wide variety of mobile apps available nowadays, ranging from games to apps that allow one to locate, book and pay for taxis or bikes online. The range of such apps is extensive, including for example:

- Fotobox, a mobile app which allows users to get mobile pictures printed and delivered to their home address from their smartphones, for which payment is taken through alternative payment providers such as PayPal.
- Weejot Donate, a new platform recently developed by PayPal and Weejot in the UK to allow charity organisations to easily and efficiently set up a mobile app which will allow users to make online donations. This platform was developed in order to assist charities, many of which have faced closure in the wake of the global financial crisis. One feature includes donation on sites such as Facebook and Twitter based on users’ social media preferences.
- Spotify which supports the music industry by monetising online streaming services. This is achieved through the collection of advertising and subscription revenue. In particular, Spotify has been able to leverage online payments to generate subscription income from users, which forms a significant part of its current revenue stream.

8 Deloitte analysis from Forrester Research Online Retail Forecast, 2012 to 2017 (Western Europe), 25 March 2013 and the EC study data.

9 This refers to products of a similar type and increases to over 16 times when the national market with the largest choice for each product sub-category in the EU27 is used as a benchmark.

10 The EC study.

11 An overview of the methodology used in the EC study is available in Appendix A.5.

12 This is based on total online retail in 2012 of approximately €110 billion. Source: Euromonitor Passport, Historic Retail Value, Internet Retailing (2012).

4.3. Online payments: supporting SME growth

“Small and medium-sized enterprises (SMEs) play a key role in shaping Europe’s economy, accounting for 99% of enterprises, of which 92% are micro-enterprises. They provide more than two thirds of private sector employment and play a key role in economic growth. They have a crucial importance to the European economy as employers and sources of innovation.”

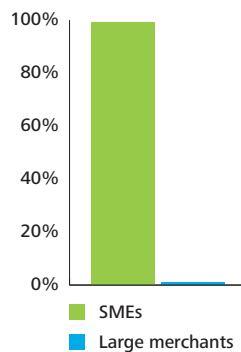
Report from the European Commission to the Council and the European Parliament¹³

Online trade facilitates participation and growth of SMEs in the economy, due to the lower costs typically involved in setting up a business online. However, in some cases smaller SMEs have been unable to fully capitalise on this opportunity as low income or unproven enterprises struggle to convince banks and larger card companies to act as clearing houses on their behalf. Alternative payment systems have provided a solution, offering a single easy payment mechanism. Instead of dealing directly with banks and card companies, merchants are able to deal with a single payment service provider, while customers remain able to use their preferred underlying payment method, whether a credit or debit card, bank account or other.

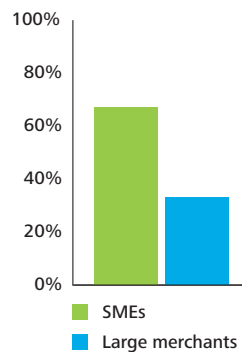
This is reflected in PayPal data which indicates that nearly three of every five euros of transaction value relates to SME trade, nearly double the level of SME transaction value across all online activity. According to PayPal data over 780,000 of the micro SMEs they support across the UK, Germany and France would have been unlikely to be able to access traditional payment methods. The highest levels of growth in SMEs using alternative payment methods are in Sweden and Poland, alongside economies differentially impacted by the recession such as Spain and Italy.

SMEs are a source of innovation,¹⁴ and provide a majority of the EU27’s employment and value added (as illustrated in the adjacent graphs). Between 2002 and 2010, SMEs contributed 85%* of net employment growth in the EU, highlighting their increasing economic relevance. Alternative online payments can further support the further expansion of SMEs online, allowing them to tap the internet’s potential, and supporting the EU27 economy.

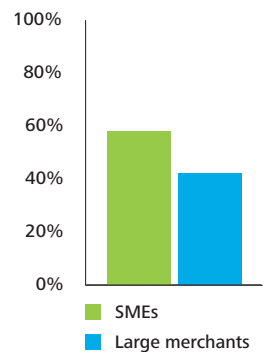
Number of enterprises



Total employment

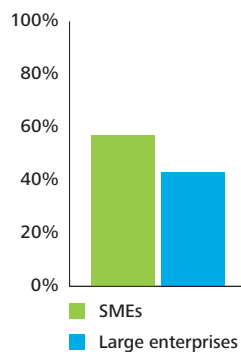


Total GVA

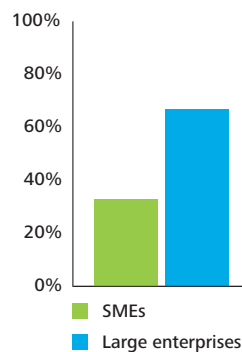


Source: EU SMEs in 2012: at the crossroads, Annual report on small and medium-sized enterprises in the EU 2011/12, ECORYS, September 2012

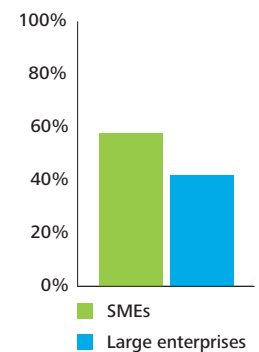
Offline retail revenue



Online retail revenue



Value of transactions made through PayPal



Source: Eurostat, PayPal data

13 Minimising regulatory burden for SMEs, Adapting EU regulation to the needs of micro-enterprises, Brussels 23 November 2011

14 Joint Research Centre. European Commission. Institute for Prospective Technological Studies (IPTS). Working Paper on Corporate R&D and Innovation – No. 07/2009 Business R&D in SMEs.

* Do SMEs create more and better jobs?, EIM for the European Commission, November 2011.

Micro businesses: The crucial role of alternative online payments

In many cases traditional online payments are not practically accessible to micro businesses. Banks may not always be willing to act as clearing houses for credit card payments or may impose onerous conditions on micro businesses wishing to deal with them.

Greece provides a particularly relevant example in the case of a Greek entrepreneur (Mr Antonopoulos) who wanted to start an online olive shop catering to international customers.¹⁵ The business aimed to trade in olive based products including oils and cosmetics, and hoped to show young Greeks that there were still opportunities for employment within the country.

In order to setup the business, Mr Antonopoulos needed an accessible online payment solution. He approached a number of Greek banks, but each refused to act as a clearinghouse unless Mr Antonopoulos agreed to write sections of his website primarily in Greek. This presented a significant obstacle as the aim of the business was to target an international market (many of whom would be unlikely to understand Greek).

In this case an alternative payment provider (PayPal) presented the only viable solution for the business. It was easy to setup and allowed customers to retain their preferred payment method while still transacting securely on the business's website.

In many cases alternative payments are targeted towards these smaller SMEs as they are sometimes underserved by traditional online payment methods, creating a gap in the market.

Now that his business has grown, Mr Antonopoulos is able to offer traditional online payment methods in addition to his original alternative online payment solution.



¹⁵ Adapted from: A Tale of a Greek Enterprise, and Olive Oil, Smothered in Red Tape, The New York Times, March 2012.

4.4. Online payments: facilitating cross border trade

“Well-functioning and well-connected EU markets where competition and consumer access stimulate growth and innovation would, in itself, serve the Europe 2020 goals. For instance, the full implementation of the Services Directive could increase trade in commercial services by 45% and foreign direct investment by 25%, bringing an increase of between 0.5% and 1.5% increase in GDP.”

Lucian Cernat, Chief Trade Economist of the European Commission

Cross border trade increases overall welfare as countries are able to trade in goods in which they have a comparative advantage. This is one of the key drivers behind the push for a single European market, and the benefits are well documented.¹⁶

Online payments have created the potential for cross border trade for merchants and consumers for whom it was not previously possible. People are able to go online and find goods in Europe and across the world at the click of a button. In 2012, 25% of online buyers in the EU27 purchased goods from other European countries.¹⁷

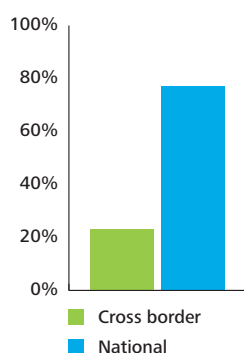
However, developing a ‘global marketplace’ through the internet requires purchasers and sellers to use similar or compatible payment systems across countries in order to transact. This is not always possible in Europe given the notable differences in payment preferences across member states.

Addressing these challenges is part of the push for a Single European Payments Area (SEPA).

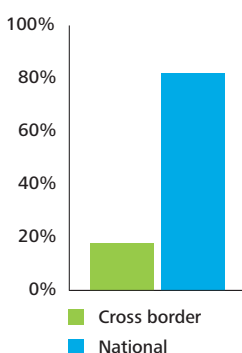
By leveraging off existing payment methods, alternative payment systems can improve the interoperability of different payment systems and allow some of these issues to be overcome. A recent study by the European Commission notes that “sophisticated online payments systems such as PayPal have a positive impact on cross border trade”.¹⁸

As illustrated overleaf, PayPal is currently estimated to process 29% of its total payment value in cross border trade, compared to the total online market average of 18%.¹⁸

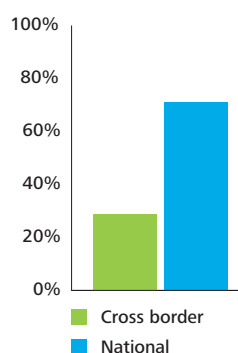
Total retail sales



Online retail sales



PayPal transaction value



Source: Deloitte analysis using PayPal data, Eurostat and ‘What does economic research tell us about cross-border e-commerce in the EU digital single market’, European Commission, Digital Economy Working Paper 2013/05

¹⁶ The literature on the benefits of cross border trade is vast. For a seminal paper see (1). More recent topics include the effects on consumer welfare (2) and (3). (1) Frankel, J.A. and D. Romer (1999), ‘Does Trade Cause Growth?’ American Economic Review 89(3): 379-99, June. (2) Broda, C and D E Weinstein (2006), ‘Globalization and the Gains from Variety’, The Quarterly Journal of Economics, 541-585. (3) Mahler L and M Seitz (2010), ‘The gains from variety in the European Union’, Munich Discussion Paper 2010-24

¹⁷ Deloitte analysis based on Eurostat data

¹⁸ Deloitte analysis using PayPal data, Eurostat and ‘What does economic research tell us about cross-border e-commerce in the EU digital single market’, European Commission, Digital Economy Working Paper 2013/05

4.5. Secure and convenient online payments facilitate sales

“More than 50 per cent of consumers in the US, UK and Germany have complained they “frequently” or “very frequently” fail to perform online transactions due to inadequate authentication and the large amount of usernames and passwords they have to remember, recent statistics indicate.”

The Paypers online, April 2013

People require additional security for online transactions as they do not have the benefit of physically seeing their retailer. Concerns regarding the misuse of personal payment details are the second most cited reason for not buying products online.¹⁹ In addition to this, most consumers require the payment process to be convenient and efficient in order to complete their transaction. The use of secure, efficient and convenient online payment systems is therefore critical to online merchants as they not only reduce the risk of fraud, but can also result in an incremental sales uplift.

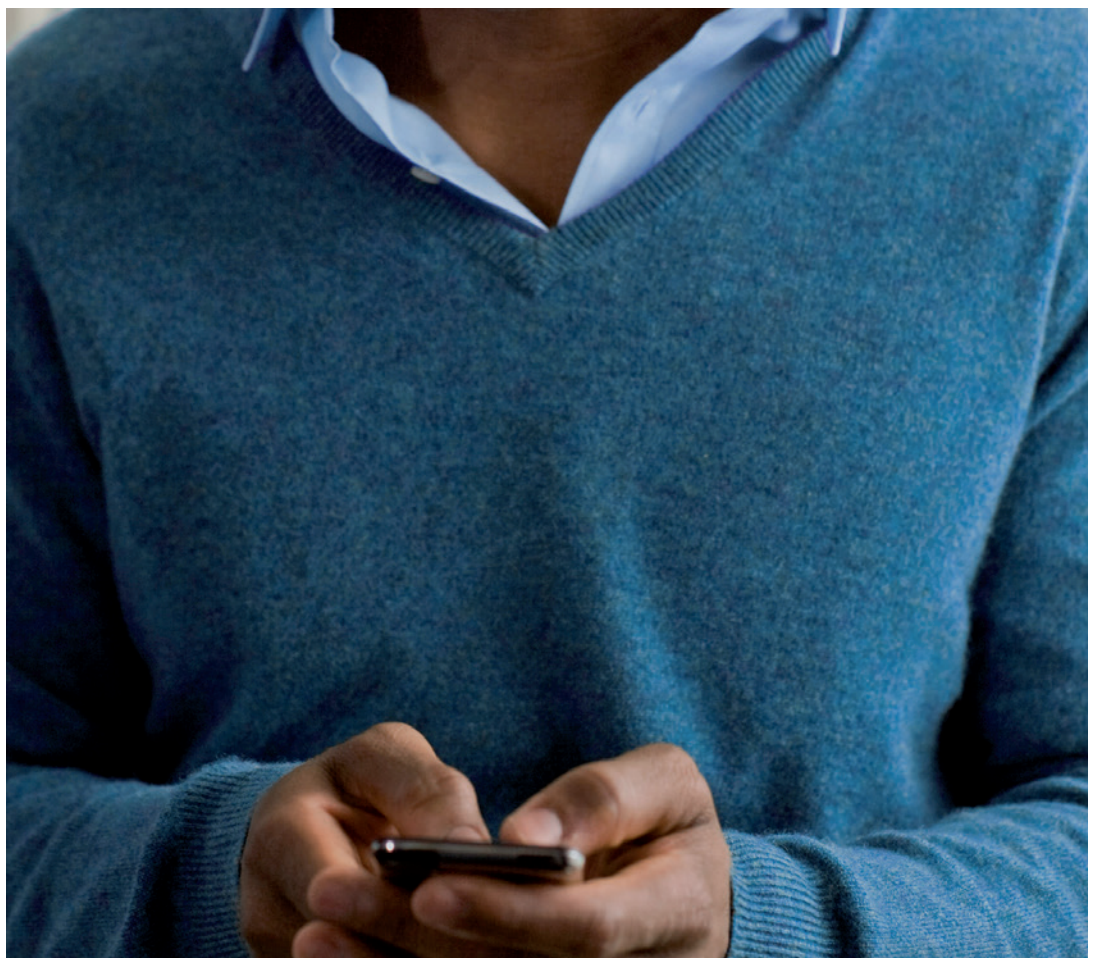
A survey commissioned by PayPal in 2012 suggested that on average, 35% of respondents said they would not have completed their online purchase if PayPal had not been offered as a payment method.²⁰ The top reason listed was security, followed by convenience and lagging much further behind, loyalty.

This pattern can be expected to be similar across other alternative online payments that provide similar benefits for online buyers in terms of security, efficiency and convenience. By grossing up these impacts the incremental sales achieved by online retailers due to alternative payment methods is estimated to be in the range of €10 billion across the EU27.²¹

¹⁹ Based on a sample of non-online shoppers within the EC study.

²⁰ This estimate ranges across the countries surveyed, from 26% in Italy, to 61% in Spain. European Sales Lift Survey – Northstar Q4 2012.

²¹ Estimated by extrapolating the PayPal survey data across the alternative online payments market.



5. Online payments contribute directly to the economy

In addition to their broad economic impacts, online payments also provide benefit through the physical presence of the industry players.

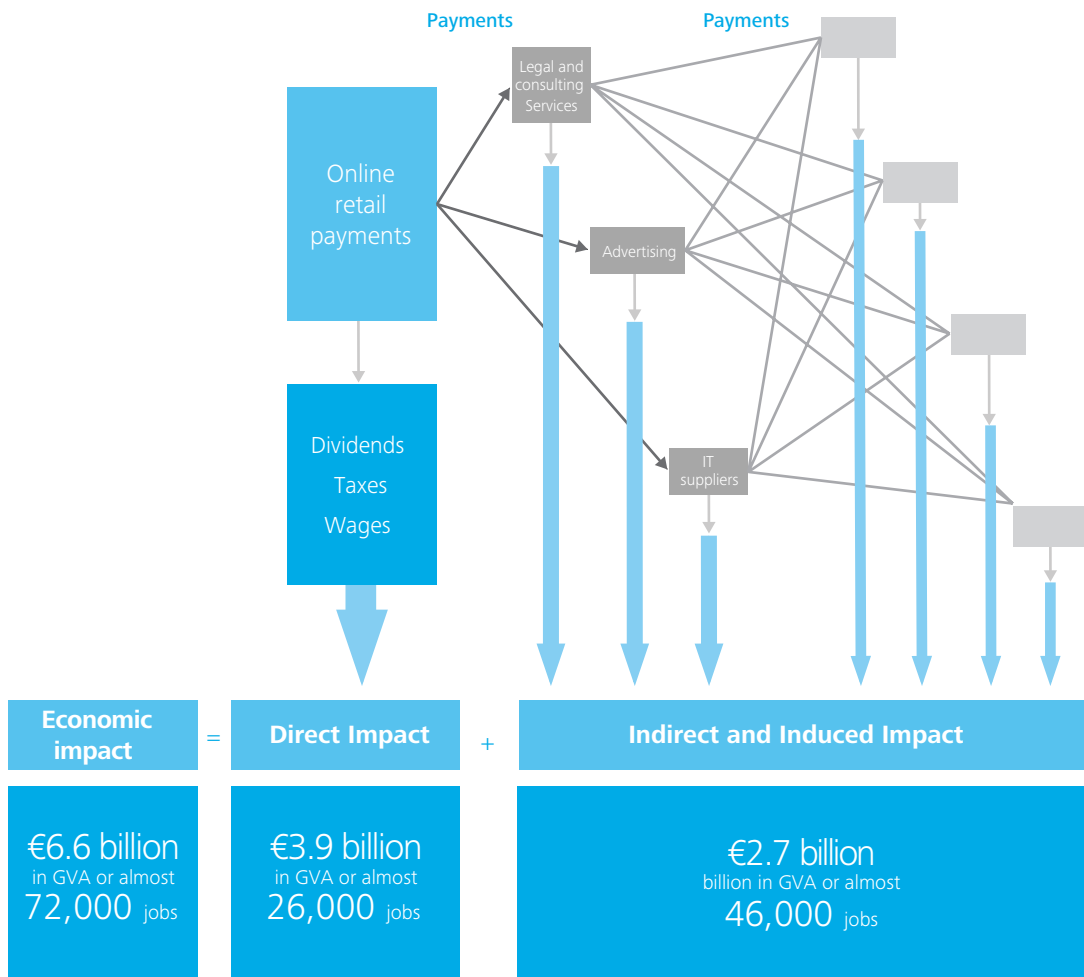
Online payments include a range of providers from credit card companies and banks to alternative payment service providers. These providers typically receive a commission from the transaction value or receive a fee. The physical footprint of online payment providers in the EU27 generates economic impact²² through:

- The profits these companies generate, and the wages and taxes they pay (direct impacts);
- Their purchases of intermediate inputs from suppliers along the value chain, such as IT and software, legal and accounting services, or rental of premises (indirect impacts); and
- Knock-on economic effects as direct and indirect impacts flow through the economy generating additional value (induced impacts).

Indirect and induced impacts are calculated through financial services multipliers for each country sourced from Eurostat. These multipliers indicate that €1 of direct output from the online payments industry generates an aggregate effect across the economy in the order of between €1.5 and €4.6 depending on the country.

Per worker productivity in the industry is higher than the EU average of €59k/annum, and varies from €115k/annum in Italy to €174k/annum in the UK.²³ Further, the industry is estimated to support almost 72 thousand jobs across the EU27, through direct, indirect and induced employment.

In aggregate, the industry generates €6.6 billion economic impact through its physical footprint; of which €3.9 billion are direct impacts and nearly €2.7 billion are indirect and induced effects across the economy. This economic contribution is much smaller than the wider economic value online payments unlock across the economy as a result of the online payment industry's catalyst role.



²² Economic impact is measured as gross value added (GVA) which comprises profits, wages and taxes and is analogous to GDP.

²³ Productivity estimates are based on data from Eurostat across the UK, France, Italy, Spain and Ireland. These figures have been extrapolated to the EU27 using an average productivity estimate. Direct employment is estimated based on labour productivity in the 'Financial intermediation, except insurance and pension funding' sector, while indirect and induced employment is calculated using average productivity across all sectors.

6. Online payments enable other economic impacts

In addition to the effects described in the previous chapters there are numerous other ways in which online payments drive economic growth. These include increased productivity, demand for ICT infrastructure and the creation of electronic data. This chapter provides a brief summary of these impacts.

E-commerce increases productivity and reduces business costs by providing a faster and more cost effective way of connecting firms, promoting more efficient collaboration between part makers and assemblers, and providing opportunities for new firms to enter the supply chain and for new business models to develop. In procurement, e-commerce provides opportunities for more business partners, faster turnaround and smaller inventories.

The growth in online retail supported by online payments has also driven incremental demand for internet enabled devices, broadband and ICT infrastructure, as a proportion of the usage of these devices and the internet is attributable to internet shopping and associated retail browsing. In the UK alone over two in three smartphone users make online payments including bank transfers on their mobiles.²⁴

Online transactions also support industries such as offline logistics which are required to deliver goods purchased online.

Online businesses need to catalogue a vast amount of information on their sites to allow customers to make informed purchase decisions without the benefit of seeing and touching the products they are buying. This has facilitated the generation of a huge volume of price, product and review data.

This data has driven innovation and competition in the online world through the development of price comparison sites, customer reviews on e-commerce retailers' sites and opportunities to analyse and leverage consumer shopping preferences. Transactional data falls within this new category of large volume, valuable data or 'big data'.

The potential value of big data to public sector administration in Europe alone is estimated at €250 billion.²⁵

The availability of online payments is also helping governments shift some of their revenue collection activities online (below), with attendant efficiency benefits.

Online payments realising benefits in the public sector

There are potential benefits from online payments which are beginning to be realised in the public sector. These relate to eGovernment initiatives which allow citizens to pay their taxes, licence fees or fines online.

Payments to Government agencies represent billions of transactions per annum across the EU27. For example in Italy alone, garbage collection, property and car taxes and administrative fines account for €34.7 billion per year involving over 428 million transactions, while in Germany, revenue and administrative fines account for approximately €1.4 billion per year.²⁶

Processing these payments online would allow governments to benefit through lower transaction costs, more timely payments and higher levels of revenue collection.

In addition this enhances transparency and efficiency within the tax system as transactions are recorded electronically rather than over the counter. This assists data management and can also reduce the shadow economy as people encounter equal conditions online.

Governments across the globe are progressively trying to exploit the potential of online payments. According to the UN e-Government Annual Survey in 2012, online tax payments are now available in 40% of the countries in the world.²⁷

Within Europe the UK, Norway and Germany are recognised as the leading providers of e-Government services.

The use of online payments as an alternative form of identity verification is also currently being developed through initiatives like the Open Identity Exchange (OIX). This aims to "build a system of standards and governance processes that allow identity credentials to be shared between trusted bodies".²⁸ The UK has already joined the OIX and recently decided to add PayPal to its list of authorised identity providers for UK Government departments. The aim is to increase choice by providing a wider range of identity providers with minimal cost to the government.

24 The dawn of mobile influence, Deloitte Digital, 2013.

25 Big data: The next frontier for innovation, competition and productivity, McKinsey Global Institute, June 2011.

26 PayPal data.

27 UN E-Government Survey 2012. Sample of 193 countries.

28 PayPal picked by UK government for online ID assurance, Paymenteye, January 2013.

Appendix A. Technical appendix

A1. Econometric methodology

This appendix presents the details of the econometric analysis carried out in order to assess the impact of online retail enabled by online payments on GDP.

A.1.1. Data

The panel dataset employed includes 85 observations: 17 cross-sections, i.e. countries, a list of which is provided below, observed across 5 years, spanning from 2005-2010.

Countries (17)

Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom

Source: Deloitte analysis

Data on the following variables was used for these observations:

Variable name	Variable description	Source
GDPpercap	GDP per capita in constant 2000 US dollars	World Bank, World Development Indicators
GovExp	General government final consumption expenditure as a share of GDP	World Bank, World Development Indicators
Inv	Gross capital formation as a share of GDP	World Bank, World Development Indicators
Trade	Trade as a share of GDP	World Bank, World Development Indicators
Part	Labour force participation rate	World Bank, World Development Indicators
EffExch	Real effective exchange rate index	World Bank, World Development Indicators
OnRetailSales	Online retail sales in constant 2000 US dollars ²⁹	Forrester Research Online Retail Forecast, 2012 to 2017 (Western Europe), 25 March 2013, World Bank, ECB

Source: Deloitte analysis

A.1.2. Methodology

The approach to estimate the contribution of the online retail industry to GDP follows the standard approach to estimate the determinants of growth in real GDP per capita. The key variable of interest is the real value of online retail sales.

There is a vast literature on the determinants of economic growth, with seminal contributions from Barro (1992), and Mankiw, Romer and Weil (1992). The literature has identified several variables that have been found to be significant in determining economic growth. A selection of these variables has been included in this regression analysis to control for their effect.

While the early literature usually investigated the question at hand using cross-sectional data only, contributions by Caselli, Esquivel and Lefort (1998)(CEL) recognised that unobserved heterogeneity at the country level may cause regression results to be biased and inconsistent. Panel data analysis can account for cross-country heterogeneity such as different institutions and attitudes towards online trade, without actually observing it. However, due to the dynamic nature of the growth equation (i.e. the inclusion of a lagged GDP per capita variable as an explanatory variable), eliminating the country specific fixed effect implies that the lagged GDP variable will be correlated with the error term. We therefore follow CEL and employ the system Generalised Method of Moments (GMM) estimator advocated by Arellano and Bond (1991). This first of all transforms the specification into first differences to remove the country specific effects. Then, under the assumption that lagged GDP per capita is not correlated with future

²⁹ Online retail sales expressed in € were converted into constant 2000 US dollars by first applying the Dollar-Euro exchange rate and then dividing by the GDP deflator calculated from GDP data.

errors, it uses combinations of lagged values of the dependent variable as instruments for lagged GDP per capita and estimates the specification using a system GMM estimator.

Analogous to the model specification discussed in CEL, the natural logarithm of GDP per capita is modelled as a function of the logarithm of lag GDP per capita and several other independent variables. The model specification is given by the following equation:

$$\ln(\text{GDPpercap}_{i,t}) = \alpha + \beta \ln(\text{GDPpercap}_{i,t-1}) + \gamma \ln(\text{OnRetailSales}_{i,t}) + x_{i,t} \delta + \theta_i + \varepsilon_{i,t} \quad (1)$$

where $x_{i,t}$ includes $\text{Inv}_{i,t}$, $\text{GovExp}_{i,t}$, $\text{Trade}_{i,t}$, $\text{Part}_{i,t}$ and $\ln(\text{EffExch}_{i,t})$

The growth literature typically considers additional variables to capture cross-country differences in political regime, human capital and institutions. However, these variables change very slowly over time, and given the short time span and the type of countries (e.g. developed European countries) this study utilises, these variables were assumed to remain constant over the time period examined. Other explanatory variables, such as the population growth rate were initially included in the regression but were subsequently excluded as they were found to be insignificant.³⁰ Finally, a dummy variable for the year of 2008 was also included in the model with the aim to account for the adverse financial crisis that affected the world economy in that year. The explanatory variables in x vector (apart from the effective exchange rate variable) were included in levels, given that they are already expressed as a share. Therefore, the interpretation of the coefficient is that a one unit change in the dependent variable leads to $100 \cdot \delta\%$ change in GDP per capita. For the variables entered in natural logarithms, such as online retail sales, the coefficient is interpreted as the elasticity, e.g. a 1% increase in online retail sales is associated with a $\gamma\%$ increase in GDP per capita.

In the model estimation, it is assumed that all variables in x are predetermined or weakly exogenous. Online retail sales are assumed to be endogenous (e.g. online retail sales drive GDP but potentially GDP also affects retail sales) and are instrumented.

A.1.3. Econometric results

Table 1 below reports the estimates of equation (1) using the Arellano-Bond methodology as discussed above.

Table 1. Econometric results

Arellano-Bond dynamic panel-data estimation: Two-step results						
Group variable: Country Time variable: Year		Number of obs = 85 Number of groups = 17				
ln(GDPpercap)	Coefficient	Stand.Err.	z-value	P-value	95% Conf. Interval	
$\ln(\text{GDPpercap})_{t-1}$	0.1579	0.0594	2.66	0.008	0.0414	0.2744
$\ln(\text{OnRetailSales})_t$	0.0100	0.0034	2.93	0.003	0.0033	0.0167
Inv_t	0.0063	0.0013	5.03	0.000	0.0038	0.0088
GovExp_t	-0.0068	0.0034	-1.99	0.047	-0.0135	-0.0001
Trade_t	0.0016	0.0003	5.25	0.000	0.0010	0.0022
Part_t	0.0113	0.0018	6.22	0.000	0.0077	0.0148
$\ln(\text{EffExch})$	0.2118	0.0774	2.74	0.006	0.0602	0.3635
2008 Dummy	-0.0125	0.0012	-10.43	0.000	-0.0149	-0.0102
Constant	6.3908	0.2061	31.01	0.000	5.9869	6.7947

Source: Deloitte analysis

The results suggest that a 1% change in online retail sales is associated with a 0.01% change in real GDP per capita. A 100% reduction in online retail in a given year during the relevant time period would then imply a 1% decrease in GDP per capita.³¹

30 If these variables remain relatively unchanged over the time period examined, then they expect to have no effect on the variability of GDP. A specification that included a time trend was estimated with the aim to capture the impact of any unobserved factors. However, the trend variable was statistically insignificant.

31 As with all such econometric investigations, this result assumes that underlying economic conditions and relationships remain within similar bounds.

The remaining variables have the expected sign and sensible magnitudes, and are significant at the 5% level. Government expenditure as a percentage of GDP has a negative coefficient, which is supported by a variety of economic literature, in line with the view that a larger government has a negative impact on GDP per capita. This includes a recent finding by the European Central Bank: ‘The model results show a significant negative effect of the size of government on growth’.³²

A.1.4. Diagnostic test

The variables under investigation are expected to be non-stationary. One way to deal with non-stationary time series is to test for cointegration and, if there is cointegration, estimate the long-run relationship between the underlying series. An alternative approach is to estimate a model with the series being transformed in first difference. Essentially, first differencing removes the non-stationary component from the series.

Given the short time span of the data, we adopt the second approach. Note that in the Arellano-Bond approach, the variables are transformed to first differences by design.

The Arellano-Bond estimator relies on the assumption that the lagged dependent variable is pre-determined, so that it is not correlated with the contemporaneous error term as well as future errors. Then, under the assumption that the errors are not serially correlated, sufficiently lagged values of $\ln(\text{GDP per capita})$ as well as $\Delta \ln(\text{GDP per capita})$ can be used as instruments for $\Delta \ln(\text{GDPpercap})_{t-1}$ in the estimation of the model above in first difference form.

The assumption of whether the error term is not serially correlated in the level specification above can be tested using the disturbances obtained from estimating the model in the differenced form. In order for the errors to be uncorrelated in the level form, the disturbances are predicted to be serially correlated of order one in the differenced form, but not of order two. The table below illustrates the results from testing this hypothesis: the hypothesis that the first differenced disturbances are not serially correlated of order 1 can be rejected but the hypothesis that they are correlated of order 2 cannot be rejected. Therefore, the hypothesis that the errors of the level equation are not serially correlated, as required by the Arellano-Bond estimator, cannot be rejected.

Table 2. Arellano-Bond test for zero autocorrelation in first differenced errors

Arellano-Bond test for zero autocorrelation in first-differenced errors		
Order	z	Prob> z
1	-2.0541	0.04
2	-0.0756	0.9397

H0: no autocorrelation

Source: Deloitte analysis

Another diagnostic test recommended when using the Arellano-Bond estimator is the Sargan test of over identifying restrictions. This, assuming that a subset of the instruments is valid, allows one to test whether the remaining instruments are valid. Table 3 below shows the results from the Sargan test, which suggest that the instruments used are valid.

Table 3. Sargan test

Sargan test of overidentifying restrictions
H0: overidentifying restrictions are valid
chi2(77) = 7.73
Prob > chi2 = 1.00

³² Economic performance and government size, Working Paper Series No.1 399, November 2011, European Central Bank – <http://www.ecb.int/pub/pdf/scpwps/ecbwp1399.pdf>

A.2. Total GDP effect

As discussed in Appendix A.1, for the variables entered in natural logarithms, such as online retail sales, the coefficient from the econometric model is interpreted as the elasticity, e.g. a 1% increase in online retail sales is associated with a 0.01% increase in GDP per capita.

This result has been used to estimate the loss in GDP per capita in one year, across the EU27, if online retail did not exist. This has been performed by assuming a 100% decrease in online retail and that population stays constant.

The econometric modelling results have been extrapolated to the EU27 on the basis that the countries included in the model have a varied range of online retail value and penetration,³³ which is considered to be representative across the remaining EU27 countries, where online retail penetration ranges between 1% and 5% of total retail. The total GDP of the 17 countries included in the model accounts for 92 % of the EU27 total.*

The total GDP effect (1% reduction in EU27 GDP per capita) is shown in Table 4 below.³⁴

This result has been apportioned the 11 countries of focus within the study, based on their approximate share of EU27 online retail in 2012.³⁵

Table 4. Total GDP³⁶ impact apportioned based on each country's estimated share of online retail in the EU27

Description	GDP effect
Estonia	65,636,737
Luxembourg	98,351,373
Ireland	1,942,619,113
Poland	3,788,899,531
Sweden	3,354,662,200
Italy	4,342,640,670
Spain	2,129,369,899
Netherlands	4,365,128,386
France	23,066,461,638
Germany	24,347,919,046
United Kingdom	41,610,959,200
EU27	125,212,099,543

Source: Deloitte Analysis, Worldbank, IMF, Euromonitor Passport, Historic Retail Value Internet Retailing (2012)

33 This ranges from 10% in the UK to 1% in Greece of total retail.

34 As with any econometric estimation, the model measures the economic impact of marginal changes in the amount of online retail, across the countries and time periods in the dataset. The magnitude of the economic impact estimated is only valid for an observable range and could be different with large changes in the amount of online retail within a country.

35 Deloitte was engaged to perform an economic impact assessment of online payments in the EU27 using the following 11 countries to develop a base level estimate: Estonia, Luxembourg, Poland, Ireland, Italy, Sweden, Spain, Netherlands, France, Germany and the United Kingdom.

36 GDP consists of the returns on resources employed, namely profits generated, plus taxes and wages paid; it excludes the value of intermediate inputs to production sourced from other organisations up the supply-chain. As such GDP is different from revenue generated.

* Deloitte analysis based on Worldbank, IMF, Euromonitor Passport, Historic Retail Value Internet Retailing (2012), Forrester Research Online Retail Forecast 2012 to 2017 (Western Europe), 25 March 2013, the EC study.

A.3. Narrow economic contribution of online payments to GDP

The narrow economic effects of an industry capture the impacts of the industry players' physical footprint and are the effects traditionally calculated in economic impact assessments.

Narrow effects are measured in terms of value added i.e. the difference between the revenue generated by an industry and its expenditure in supply chain inputs.

Total narrow economic impacts can be split into three categories:

- Direct impacts: the profits these companies generate, and the wages and taxes they pay;
- Indirect impacts: the value added generated from their purchases of intermediate inputs from suppliers along the value chain, such as IT and software, legal and accounting services, or rental of premises; and
- Induced impacts: knock-on economic effects as direct and indirect impacts flow through the economy generating additional value (induced impacts).

Direct value added

This study has estimated the direct value added of the online payments industry by multiplying total industry revenue by the share of value added per unit of revenue in the relevant sector (the "value added to output ratio"), 'Financial services, except insurance and pension funding'. This was performed across 11 selected countries and then extrapolated to the EU27 using online retail estimates. The value added to output ratio ranged between a low of 0.14 in Luxembourg, to a high of 0.77 in Spain.

Total industry revenue was approximated using PayPal revenue and market share data for 2012.

The results show a direct economic impact of €3.9 billion in the EU27 in 2012.

Indirect and Induced value added

In order to determine the indirect and induced benefits created, total industry revenue in each of the 11 selected countries is multiplied by the 'Financial services, except insurance and pension funding' multiplier in that country,³⁷ using data from Eurostat. These multipliers range from 1.46 in Spain to 2.08 in the Netherlands, with Luxembourg having the highest multiplier of 4.58.

This approximates the total output generated across the economy as a result of the online payment industry. Total industry revenue, less direct industry revenue, gives the total indirect and induced revenue generated across the economy.

This indirect and induced revenue effect is converted into value added, by multiplying by the economy wide value added to output ratio. This varies between 0.32 in Luxembourg to 0.50 in France. This effect is extrapolated to the EU27 based on total online retail revenue.

The indirect and induced economic impacts are estimated to be €2.7 billion in the EU27.

Results

Results for the direct, and indirect and induced effects are summarised in Table 5.

³⁷ The financial sector multipliers are estimated using Input-Output models which trace the interdependencies between individual sectors and the wider economy. The most recently available Domestic Use Matrix has been obtained for each country from Eurostat. Each matrix is then used to give a matrix of coefficients which is then subtracted from the identity matrix. The result is then inverted to give the Leontieff inverse. The final matrix details Type II multipliers. This means that for €1 of direct output and a Type II multiplier of 2.5, the indirect and induced effects created throughout the wider economy would be €1.5.

Table 5. Narrow economic impact of the online payments industry in the EU27 (2012)

Country	Direct Value added (€m)	Indirect and Induced value added (€m)	Total narrow value added (€m)
Estonia	3	2	5
Luxembourg	7	60	67
Poland	48	31	79
Ireland	108	75	183
Italy	156	77	233
Sweden	188	100	288
Spain	300	83	384
Netherlands	228	243	471
France	308	353	660
Germany	455	495	950
United Kingdom	1,575	814	2,389
EU27	3,874	2,678	6,552

Source: PayPal data, Eurostat, Deloitte analysis. Totals may not sum due to rounding.

A.4. Broad economic contribution of online payments to GDP – through lower prices

The estimation of the increase in sales resulting from lower online prices reported in Section 4.1 is calculated using a consumer market study commissioned by the European Commission³⁸ (the EC study).

The study relies on the concept of consumer surplus to estimate the consumer welfare gains resulting from lower prices available online compared to offline. It follows the methodology in Brynjolfsson, Hu, and Smith (2003), to calculate the consumer surplus resulting from lower online prices as follows:

Equation 1

$$CV = -\frac{p_1 x_1 (1-\rho) x_0}{(1+\alpha)} = -\frac{p_1 x_1 - (1+\rho) p_1 (1+\rho\alpha) x_1}{(1+\alpha)}$$

Where CV is the change in consumer surplus³⁹ resulting from lower prices in the online market compared to the offline market, α is the price elasticity for the online market products, (p_1, x_1) are the current price and quantity of goods in the online market, (p_0, x_0) are the price and quantity for goods in the offline market and ρ is the difference between online and offline prices (in percentage).

38 Consumer market study on the functioning of e-commerce and internet marketing and selling techniques in the retail of goods, Civic Consulting prepared for the EC, 2011, available at: http://ec.europa.eu/consumers/consumer_research/market_studies/e-commerce_study_en.htm

39 It should be noted that under the assumption of no income effects or neither normal nor inferior goods, the compensating valuation estimated in equation () is equal to the concept of consumer surplus.

Two components of Equation 1 are used in our methodology:

1. **The price elasticity for all products in e-commerce in the EU27.** The study relies on an approximation of the price elasticity based on Amazon data. The elasticity estimated by the EC study is -4.
2. **The difference between online and offline prices for e-commerce products in the EU.** The study estimates two price differences. The first is the weighted average difference in online and offline prices within each national market, taken from a sample of seven major products categories, 15 product subcategories and a total of 17 EU countries. The results are then extrapolated to the EU27 to show that prices are on average 2.6% lower online than offline within each country. The second estimate is the weighted average difference when comparing offline prices within each country to the lowest available online price across countries. This assumes that consumers across countries would all trade cross border to purchase goods at the lowest available price. This estimate shows that prices are 21.2% lower online than offline when comparing offline prices to the lowest available online prices.

Using the information provided in the EC study and recognising the limitations of these estimations, we approximate the sales effect attributable to lower online prices by assuming:

$$\alpha = -4$$

$$\rho = (2.6\% \times 82\%) + (21.2\% \times 18\%) = 6.0\%$$

Note: ρ assumes that 18% of consumers will take advantage of cross border trade.⁴⁰ On average this means prices are estimated to be 6.0% lower online than offline across the EU27 (taking an 18% level of cross border trade into account).

These figures are used in this study to calculate the level of trade which would occur if online retail occurred at offline prices. This is estimated to be 79.4% of the current level of online trade.

$$p_0 = p_1 \div (1 - \rho) = 106.3\%$$

$$x_0 = x_1 \times (p_1 - p_0) \times \alpha = 74.7\%$$

$$p_0 x_0 = 79.4\%$$

The sales effect due to lower prices online compared to those available offline, is therefore estimated to be approximately 20.6% or €23 billion.

A.5. Broad economic contribution of online payments to GDP – through increased consumer choice

The estimation of the level of online sales due to products available online which are not available offline has been developed using the EC study referenced in A.4 above.⁴¹

In this context, when a product's online market provides more choices than the product's offline market, consumer welfare increases from accessing the larger selection of product choices online.

Following Brynjolfsson, Hu, and Smith (2003), the authors estimate the change in consumer surplus resulting from increased online choices in a product market using the following equation:

⁴⁰ This is based on the value of cross border e-commerce trade within the EU27 which is calculated to be 18% of e-commerce trade. Source: What does economic research tell us about cross-border e-commerce in the EU digital single market, European Commission, Digital Economy Working Paper 2013/05.

⁴¹ Consumer market study on the functioning of e-commerce and internet marketing and selling techniques in the retail of goods, Civic Consulting prepared for the EC, 2011, available at: http://ec.europa.eu/consumers/consumer_research/market_studies/e-commerce_study_en.htm

Equation 2

$$CV = \frac{-p_1 x_1}{1 - \alpha}$$

where CV is the change in consumer surplus due to the increased choices in the product's online market compared to the product's offline market, α is the price elasticity for the product's online market, (p_1, x_1) are the price and quantity in the online market for products that are unavailable in offline commerce. The calculation of the latter involves the use of sales data concerning those products that are sold online, but not offline. As this data is not available, Brynjolfsson, Hu, and Smith (2003) developed a methodology assuming that product sales and sales rank follow a log-linear (Pareto) distribution:

Equation 3

$$\log(\text{Quantity}) = \beta_1 + \beta_2 \log(\text{Rank}) + \varepsilon$$

Therefore, the Pareto slope is used to calculate the proportion of online sales that can be attributed to products that are not available offline. Using the proportion of online sales that fall above a particular rank as:

Equation 4

$$r(x, N) = \frac{\int_x^N \beta_1 t^{\beta_2} dt}{\int_x^N \beta_1 t^{\beta_2} dt} = \frac{N^{(\beta_2+1)} - x^{(\beta_2+1)}}{N^{(\beta_2+1)} - 1}$$

Where x is the rank and N is the total number of products available.

The report for the EC collected data on offline choice and online choice across 17 EU countries and over a selection of seven product categories for all sales outlets visited and extrapolated to the EU27. In order to do so, a weighted average difference between online choice and offline choice was calculated, based on the countries and product categories for which there was data available. This weighted average difference between online choice and offline choice was assumed to apply to all the EU countries and all the product categories covered by internet retailing. For a more detailed discussion about the data, see Civic Consulting (2011).

The EC study uses the methodology described above to calculate the impact on online retail sales that can be attributed to products that are not available offline. The study uses the following values in Equation 4, 14.8 as x , that is, the average number of products in offline retailing in the EU, and 14.8 (1+153%) = 37.6 as N where 153% is the difference between online and offline choices and using the Pareto slope provided by Brynjolfsson, Hu, and Smith (2003) (-0.871). This estimates the level of online sales that can be attributed to the wider range of choices online that are not available offline to be 30.3%.

This figure from the EC study is applied here to the current level of online retail sales across the EU27. This approximates the sales occurring online due to the wider range of choices online that are not available offline to be in the range of €33 billion.

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