

OXFORD ECONOMICS

The Economic Impacts of Air Travel Restrictions Due to Volcanic Ash

A report prepared for Airbus



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1 Introduction

On 14 April, 2010, Iceland's Eyjafjallajökull volcano spewed an ash plume which rose over three kilometres into the sky. Concerns over engine safety caused an interruption in global air traffic to an extent not seen since 11 September, 2001 and the largest breakdown in European civil aviation since World War II. The closure of large portions of European air space over the week 15-21 April disrupted global travel, trade and business—demonstrating the integral role air transport plays in the basic functions of society and commerce. The effects of the crisis extend far beyond the direct impact on the air transport industry. The impact has been felt acutely by travellers and destinations; exporters and those reliant on imported inputs; as well as general production and productivity.

This report, commissioned by Airbus, estimates the far-reaching economic impacts of this disruption in air transportation. The focus of the analysis is on the initial week of the crisis, where the majority of impact has occurred. However, periodic flight cancellations have continued at irregular intervals, extending the impacts through the third week of May, 2010. This study may be used as an indicator of potential impacts moving forward.

This study should also be understood in the context of the broad economic impact of the aviation sector as assessed in 2009. This report is available at: <http://www.oxfordeconomics.com/FREE/PDFS/OEAVIATION09.PDF>.

Summary of Volcano Impact Findings

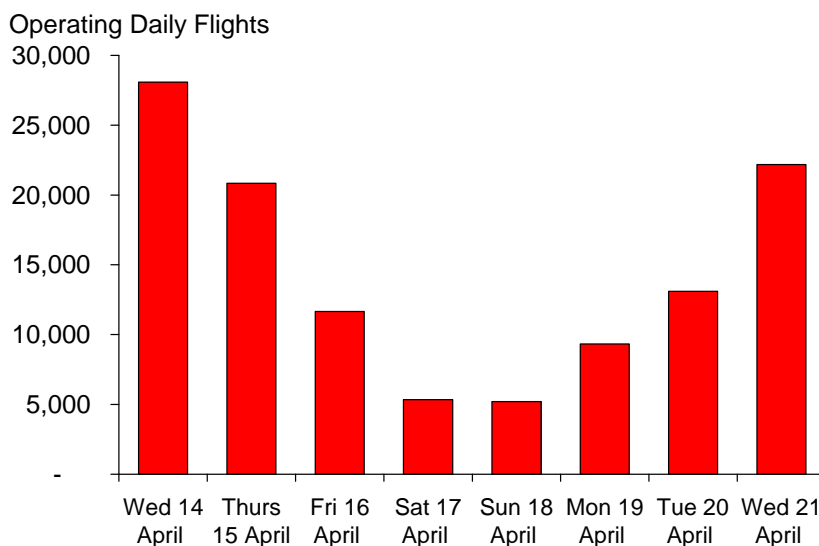
- Global aviation sector losses in the first week tallied US\$2.6 billion. However, when factoring in deferred business and leisure travel, the net aviation sector impact was US\$2.2 billion.
- The visitor spending impact realised by destinations around the world is estimated at US\$1.6 billion in lost revenues, primarily to hospitality sectors.
- Productivity losses stemming from stranded workers are estimated at US\$490 million.
- International trade has also been severely disrupted as a result of the flight restrictions—particularly for perishable goods and for just-in-time production processes (e.g. high-value items which are also low-weight such as electronic parts and machine components).
- The total impact on global GDP caused by the first week's disruption amounts to approximately US\$4.7 billion.
- Since the massive airspace shutdown in the first week, another 5,000 flights have been sporadically cancelled. This would add an additional 5% to the first week impacts, bringing the total cost to US\$5.0 billion lost GDP through 24 May, 2010.

2 Overview

Scheduled commercial flights were first affected 15 April, declining 27.1% from the previous week, according to Eurocontrol. Traffic steadily declined over the following days as the cloud moved over the continent with cancellations reaching their zenith of 80% on 18 April. Air traffic volumes were nearly 20,000 lower than in the previous week at around 5,000 flights compared with 25,000. For the seven day period from 15–21 April, more than 100,000 fewer flights traversed European airspace than in the previous week, a 53% fall.

Air traffic resumed to near-normal levels on 22 April with over 27,000 flights to and/or from European airports. However, some flight schedules have remained backlogged into the subsequent week as airlines balance the demands of cancelled and current itineraries.

Figure 1-1: European Flights Operating



Source : Eurocontrol

The cancellation of flights across Europe affected an estimated seven million passengers and disrupted supply routes around the globe.

Gross aviation sector losses are estimated at US\$2.6 billion as a function of lost business. However, it is reasonable to assume that some travel, both leisure and business, will be deferred and eventually taken. The net aviation sector impact is US\$2.2 billion when factoring in this subsequent travel. These impacts are measured on the expenditure, or fare, side of the equation and are felt by airlines, airports, governments (in the form of lost taxes), and a range of service providers to the aviation sector.

Larger economic impacts will be felt at the destination level in the form of foregone spending on hotels, restaurants, taxis, shopping, and entertainment. During the week of air travel disruption, all regions of the world felt these impacts and they are continuing into the following week. Nearly all inter-regional travel involving Europe was affected by the crisis and, as a result, every region of the world felt the impact of lost visitors with a potential loss (over and above aviation sector losses) of US\$4.2 billion in visitor spending.

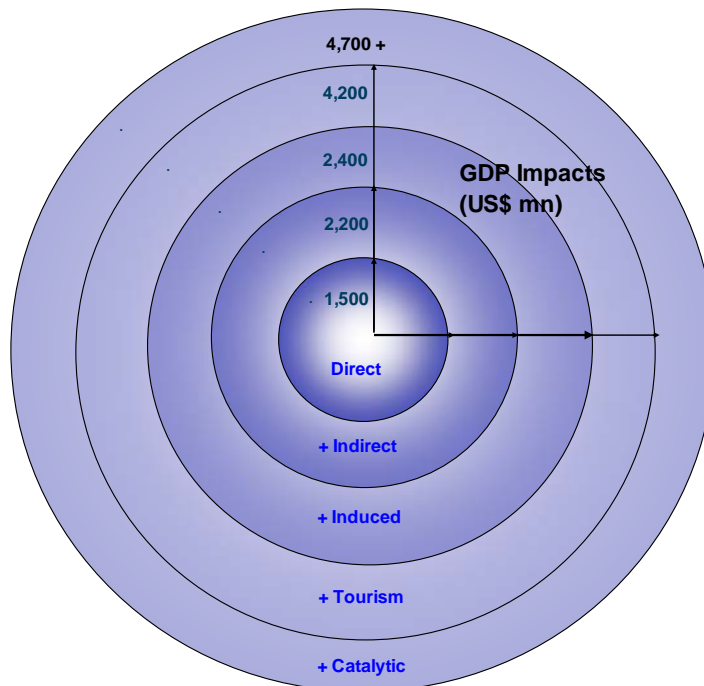
However, a number of factors offset the magnitude of impacts at the destination level. Stranded passengers around the world spent additional monies in hotels and restaurants. Some found alternative means of transportation. In addition, some leisure travellers changed their plans to nearer destinations. However, these expenditures are on average well below those of travellers on planned itineraries. The net visitor spending impact around the world is estimated at US\$1.6 billion in lost revenues, primarily to hospitality sectors.

Beyond these direct effects, economies around the world have been damaged indirectly as suppliers to the transport and hospitality sector realise indirect losses. Further, economic output is broadly reduced as lost employee income translates into lower downstream consumer and business spending.

In addition, we discuss the impact on international trade and in particular on both fast-perishing goods (eg fresh-cut flowers, vegetables such as green beans, exotic fruit) and 'just-in-time' production components (eg high-value items which are also low-weight such as electronic parts and machine components). Finally, we estimate the lost output that results from workers being stranded and unable to work.

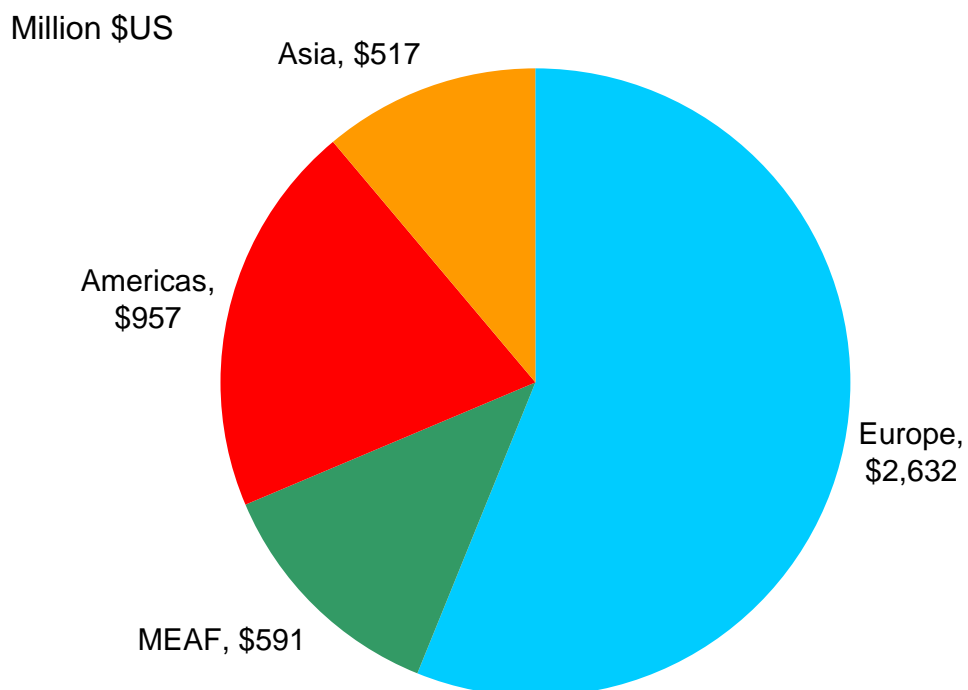
The total impact on global GDP will amount to approximately US\$4.7 billion as airlines, airports, hotels, convention centres and a host of other sectors realise lost business both during and after the shutdown of airspace.

Figure 1-2: Summary of Global Impacts



Source : Oxford Economics

Figure 1-3: GDP Impact by Region



Source : Oxford Economics

3 Far-reaching Economic Impacts

The European air space closure left millions of air passengers stranded around the world and millions of would-be travellers at home. An estimated seven million passengers were affected by the disruption of air service. Nearly six million European air passengers were affected, with over one million travellers affected outside Europe.

After taking into account the offsetting spending of deferred travel, diverted travel, and spending by stranded passengers, airlines and destinations lost US\$3.8 billion in net revenue.

On a broader scale, the temporary shutdown of air travel resulted in US\$4.7 billion dollars of lost global GDP once the indirect (supply chain), induced (additional consumer spending), and worker productivity impacts are included.

Seven million passengers were affected by the shut down, costing \$4.7 billion in global GDP.

Table 2-1: Summary of Worldwide Impacts of Aviation Shutdown

Worldwide Impacts of Aviation Shutdown						
	Europe	MEAF	Americas	Asia	Total Worldwide	
Passengers Affected (by destination)	5,934,240	406,926	439,259	244,938	7,025,363	
Gross Aviation Impact	\$ 1,606,137,277	\$ 337,297,102	\$ 395,758,233	\$ 253,783,316	\$ 2,592,975,927	
Net of...						
Deferred Airfares	\$ 236,071,166	\$ 84,324,275	\$ 59,363,735	\$ 38,067,497	\$ 417,826,674	
Net Aviation Impact	\$ 1,370,066,110	\$ 252,972,826	\$ 336,394,498	\$ 215,715,818	\$ 2,175,149,253	
Gross Destination Impact	\$ 2,794,943,049	\$ 406,926,204	\$ 657,995,318	\$ 366,908,752	\$ 4,226,773,324	
Net of...						
Stranded Passenger Spend	\$ 1,295,059,421	\$ 95,627,658	\$ 164,722,188	\$ 91,851,736	\$ 1,647,261,002	
Domestic Substitution Spend	\$ 205,488,440	\$ 15,259,733	\$ 16,472,219	\$ 9,185,174	\$ 246,405,565	
Deferred Travel Spend	\$ 427,853,171	\$ 101,731,551	\$ 98,699,298	\$ 55,036,313	\$ 683,320,332	
Net Destination Impact	\$ 866,542,019	\$ 194,307,262	\$ 378,101,614	\$ 210,835,530	\$ 1,649,786,425	
Net Business Sales Impact	\$ 2,236,608,129	\$ 447,280,088	\$ 714,496,113	\$ 426,551,348	\$ 3,824,935,678	
GDP Impacts						
Direct - Air Transport	\$ 936,797,804	\$ 172,972,958	\$ 230,013,446	\$ 147,498,068	\$ 1,487,282,277	
Indirect - Air Transport	\$ 433,268,306	\$ 79,999,868	\$ 106,381,052	\$ 68,217,750	\$ 687,866,977	
Induced - Air Transport	\$ 137,006,611	\$ 25,297,283	\$ 33,639,450	\$ 21,571,582	\$ 217,514,925	
Destination Impacts	953,196,917	213,738,145	415,912,080	231,919,252	\$ 1,814,766,393	
Productivity Losses	171,900,000	98,900,000	171,300,000	48,000,000	\$ 490,100,000	
Total	\$ 2,632,169,638	\$ 590,908,253	\$ 957,246,028	\$ 517,206,652	\$ 4,697,530,571	
Share of One-Week GDP	0.67%	1.83%	0.24%	0.16%	0.40%	

3.1 European travel

Given the high proportion of cancelled flights in Europe, the costs to the aviation industry within Europe are relatively high, with 85% of the US\$1.6 billion gross impact on the industry being ultimately realised at a cost of US\$1.4 billion in net revenue.

Many stranded travellers in Europe had the option of alternate modes of transportation, generally auto or rail (but some by sea), or to remain in their destinations until air service resumed. Would-be travellers (who had not yet begun their trips) also had the options of alternate modes of transportation, or substituting destinations, or deferring travel to a later time.

While the gross impact from the lost arrivals of scheduled travels indicates a potential cost to European destinations of US\$2.8 billion, once allowances for other travel options and the spending of stranded travellers are made the net impact is significantly smaller. For example, even though some resort operators reported losses approaching US\$10 million per day at the peak, hotels in gateway cities and airport properties were reporting higher occupancy and charging higher rates. Data from STR Global showed revenue per available room more than doubling for the week ending 17 April at airport properties in Brussels and Frankfurt and more than 50% increases at other airport properties across Europe.

Thus, we estimate European destinations only felt an estimated 31% of the potential impact of lost visitation, amounting to US\$867 million in lost sales. Total losses for the aviation industry and destinations in Europe amounted to US\$2.2 billion for the week. The total GDP impact for Europe (for aviation and destinations) is estimated at US\$2.6 billion.

***The air service
disruption cost
Europe \$2.6 billion
in GDP.***

3.2 Travel outside Europe

Destinations outside of Europe do not have the same magnitude of offsetting benefits as Europe and net impacts are closer to the gross impacts. The relative lack of alternate modes of transportation weighed heavily on the plans of travellers. However, the overall impact remains larger for Europe as the epicentre of most disrupted travel.

Stranded travellers did provide some offsetting spending, but daily visitor spending was assumed to be on average less than that of the would-be visitors. Travel budgets of stranded passengers would be necessarily stretched thin over the course of the week. Indeed, some passengers spent their days and nights in airports.

The travel industry as a whole also benefited from travellers who opted for travel to destinations outside of Europe.

3.2.1 Americas

Outside of Europe, destinations in the Americas took the largest hit from the disruption. Nearly 462,000 passengers were affected costing aviation US\$336 million in revenue (of a potential gross loss of US\$396 million). Destinations realised 58% of potential losses amounting to US\$378 million. The total effect on GDP amounts to 0.24% of GDP for the week (US\$957 million).

The Americas' losses totalled \$714 million in direct business revenue and \$957 million in GDP.

3.2.2 Middle East and Africa

The net impact on the air transport sector in MEAF was US\$253 million, 75% of gross cancellations. Destinations in MEAF saw net losses of US\$194 million. The relative impact on GDP in MEAF, however, was the greatest of all regions, costing the region US\$591 million, 1.8% of a week's GDP.

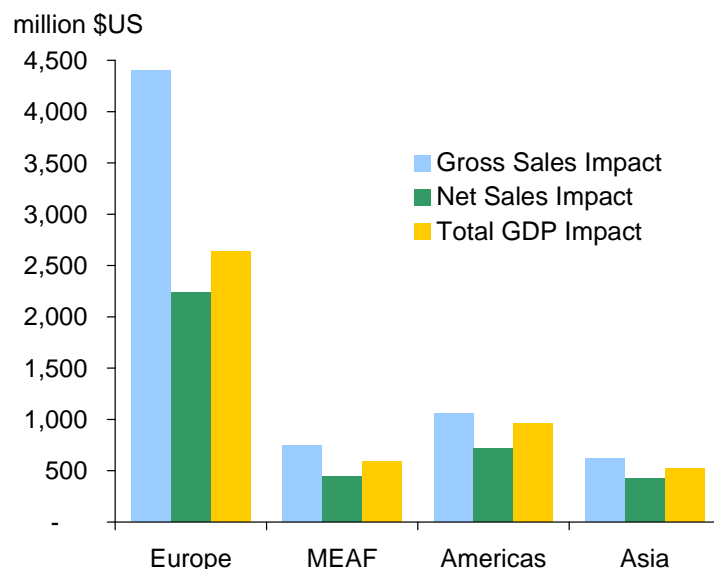
GDP losses in MEAF were 1.8% of the average weekly GDP.

3.2.3 Asia

With the fewest travellers affected (less than 250,000), the net aviation impact in Asia was US\$216 million. Lost spending in Asian destinations was US\$211 million (58% of gross destination impact, on par with the Americas). The global effects of the disruption on GDP were the smallest in Asia at US\$517 million, equivalent to around 0.16% of the region's GDP for the week.

Asian economies lost \$517 million in GDP.

Figure 2-1: Regional Impacts by Level



Source : Oxford Economics

4 Trade and Productivity Impacts

4.1 International Trade

International trade has been severely disrupted as a result of the flight restrictions. While some of the disrupted trade can simply be deferred, that is not the case for products that are either fast-perishing (eg fresh-cut flowers, vegetables such as green beans, exotic fruit) or crucial for just-in-time production processes (eg high-value items which are also low-weight such as electronic parts and machine components). The disruption to the transportation of these products will result in lost revenue for producers and, in the case of just-in-time delivery, to customers who are reliant on the deliveries for the smooth operation of their plants.

4.1.1 Perishable goods – fresh cut flowers, fruit and vegetables

The impact on producers of flowers and fruit and vegetables in African countries such as Kenya, Zambia and Ghana has been widely reported, with delays in transportation meaning large quantities of fast-perishing produce have either gone off or rotted, leading to losses for producers. Kenya's Fresh Produce Exporters Association Daily Nation estimated losses of US\$3 million a day for local producers of flowers, fruit and vegetables and stated that thousands of workers had been temporarily laid off. Meanwhile the World Bank president Robert Zoellick has stated that African countries may lose US\$65 million due to the effect of the airspace shutdown on perishable exports.

Data from Eurostat, the official statistical office of the EU, shows that over three-quarters of fresh cut flowers exported to the EU in 2009 came by air, with a total monthly value of US\$81 million in April 2009. Africa provided over half of this (US\$46 million) in April 2009. On this basis, a week long cancellation of flights would mean losses of just over US\$11 million for the African flower industry. Kenya, which accounts for about two-thirds of flower exports to the EU, would lose over US\$7 million in a week.

Exports of flowers to the EU are also important to South America¹. Just under US\$300 million² of flowers were exported to the EU from Latin America by air in 2009, US\$21 million in April 2009 alone, with most of this coming from Ecuador and Argentina. A week long halt to flights to the EU would have cost Latin American flower producers around US\$3 million based on these trade figures.

In terms of fresh fruit and vegetables that are transported by air, some of the largest categories are leguminous vegetables (green beans and peas) and exotic fruit such as melons and mangoes. Taking the example of green beans,

Lost sales to African countries may total US\$65 million.

Lost sales of flowers may cost Kenya US\$7 million.

¹ Assuming that alternative modes of transportation are mostly not viable due to the short life span of the produce.

² This figure consists of exports from South and Central America and the Caribbean.

data from Eurostat shows that 46% of imports into the EU in 2009 were by air, with a value of US\$240 million. In April 2009 alone US\$24 million were imported by air into the EU. Over 90% came from Africa during that month (US\$15.6 million), while Kenya alone accounted for 54% (US\$9.3 million) of the total. These figures imply losses for African and Kenyan exporters of green beans of US\$3.9 million and US\$2.3 million respectively as a result of a week long shutdown of EU airspace.

4.1.2 Electrical and machine parts and equipment

Just-in-time inventory controls are now increasingly important for companies around the world. Under just-in-time, an increasing number of firms hold only very limited 'buffer' inventories in case they run short of critical sub-components or spare parts. Instead, they require their suppliers (which may be other parts of their business) to deliver to a strict timetable to fit in with the production runs. It is estimated, for example, that this system has contributed to a reduction of over 20% in the inventory-output ratio in the UK over the last 20 years. Large savings are likely to have been achieved in other developed economies. Just-in-time requires the rapid and reliable delivery of components which only aviation can provide

The disruption to air services has affected these just-in-time processes and, for example, has led to temporary suspensions in car production at BMW and Nissan plants in Germany, USA and Japan due to shortages of air-freighted components such as pressure sensors. Aviation is a key mode of transporting these types of goods in a timely manner. For example, data from Eurostat shows that in 2009 goods transported by air accounted for less than 1% of all goods traded in the EU by weight, but over a fifth by value. Although production at these car plants was expected to resume once European airspace opened again with no significant losses expected, the disruption caused at these plants demonstrates the central role of aviation in the trade of high-value parts/equipment and the global manufacturing supply-chain.

In all, US\$48 billion of electrical/machine parts and equipment was supplied to the rest of the world from EU producers in 2009. Meanwhile in the other direction, an estimated US\$76 billion was imported into the EU from the rest of the world in 2009, of which US\$6.3 billion occurred in April 2009. The vast majority, around three-quarters came from Asia-Pacific, with around 20% from North America. Within this context the Korea International Trade Association has stated that losses for domestic industries between April 16 and 19 were an estimated US\$112 million, with suppliers of mobile phones and semi-conductors the hardest hit.

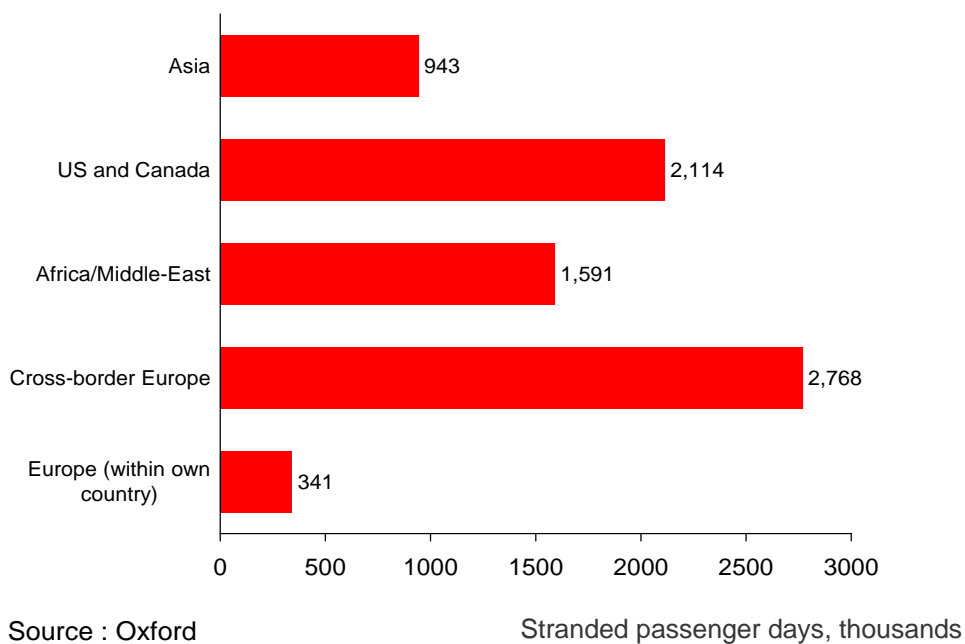
***Korean
component
supplier losses are
estimated at
US\$112 million.***

4.2 Lost Output from Stranded Passengers

The closure of large parts of European air space left hundreds of thousands of passengers stranded around the globe unable to return home when they had originally planned. We estimate that, once allowance has been made for passengers returning by alternative means, Europeans passenger "stranded

days” totalled just less than 2.8 million days, and that does not allow for the difficulties passengers are encountering getting home even once the majority of the airspace has reopened. It is not just Europeans who are stranded, we estimate North American passenger ‘stranded days’ total 2.1 million (see Figure 3-1).

Figure 3-1: Total number of stranded passenger days by region



There is obviously considerable inconvenience for those passengers stranded and for those who have jobs there is a knock on impact on their company's work. Although there are a number of factors that will help to limit the impact of GDP:

- some workers will be able to work from the location they are stranded in (e.g. those who typically work from home);
- workers' colleagues will be able to cover some activities;
- some workers will, to some extent, be able to catch-up on work when they finally make it home; and
- some workers may be required to take the time stranded as holiday, i.e. their holiday entitlement is reduced meaning there is effectively no additional days lost over the whole year. Although if workers have to take the days stranded as unpaid leave then this will reduce and not simply defer GDP.

The existence of these mitigating factors has been shown in studies that have assessed the economic impact of having an additional public holiday which all find that lost GDP is significantly less than the average GDP produced per day over the whole year.

In order to estimate for the lost GDP due to stranded passengers around the world we have used our global economic model to estimate the stranded “employment days” (i.e. the number of stranded days which would have been days spent working) and the per day productivity of these workers.

This gives a potential lost GDP figure of US\$1.4 billion, before accounting for the mitigating factors mentioned. These mitigating factors are difficult to assess, but based on previous studies it is our judgment is that at least half of the potential lost GDP will be made up. Given a range of 50%-80% of the potential lost GDP recovered in one way or another, the final actual loss to global GDP from stranded workers would be in the region of US\$280-\$700 million.

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