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EBOLA CONTINGENCY SCENARIO



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The views contained in this working paper are entirely those of the research team of the Cambridge Centre for Risk Studies, and do not imply any endorsement of these views by the organisations supporting the research.

This report describes a scenario analysis of an upper bound of projections for Ebola cases in US and Europe and is presented as a stress test for risk management purposes. It does not constitute a prediction. The Cambridge Centre for Risk Studies develops scenarios for use in improving business resilience to shocks. These are contingency scenarios used for 'what-if' studies and do not constitute forecasts of what is likely to happen.

Analysis of Economic Impact of Upper Bound Ebola Projections for US and Europe

Cambridge 'Contingency' Scenario developed for business preparedness planning

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The current Ebola outbreak in West Africa, if it resulted in multiple clusters of cases in United States and Europe, could cost the world's economy over a Trillion dollars in lost output.

The Cambridge Centre for Risk Studies has modelled the consequences of the upper bounds of published epidemiological projections for how many Ebola cases might be expected in the US and Europe as a result of the 2014 Ebola outbreak in West Africa. The public is likely to react to the horror of this virulent disease in their community as they have done with similar virulent diseases in the past (SARS, polio, Avian Flu) by reducing economic consumption and decreasing labour participation. The consequence of this on today's fragile economy is to trigger a period of reduced economic growth and increased unemployment. In 2015, 1% of the world's GDP (\$0.76 Trillion) would be lost, relative to the expected economic trajectory if the Ebola scenario does not occur. The economic shock waves would continue for several years, ultimately taking \$1.4 Trillion from the world's economic output that would otherwise be expected over the next 5 years.

This scenario is not a prediction or an *expected* outcome, but is described as a 'contingency' scenario to help businesses put in place preparedness measures to improve their resilience to disruption from future infectious disease epidemics.

Current Status of the Ebola Outbreak in West Africa

Ebola is continuing to spread through West Africa. Progress on containing the disease is mixed. Nigeria and Senegal are declared disease free, and focus on safe burial of the dead and improved treatment and changed cultural practices appears to have reduced the speed of spread in Liberia. However cases in Sierra Leone continue to increase and infection has now reached the densely populated capital, Freetown. A new outbreak in Mali is causing additional concern. Overall case loads are still increasing and the death toll is rising. The international community is bringing in personnel and resources to the affected region, but is facing criticism for being slow to fulfil its aid pledges. Of the \$500m budgeted by the World Bank Group for the emergency response, only \$117m has been disbursed¹. Construction is underway of new treatment centres, but it is slow work with less than a third of the planned bed capacity completed².

Outlook for the Future of the Ebola Epidemic

Future projections forecasting the progress of the epidemic have been helped by the release by the US Centres for Disease Control of their own epidemiological spread model of the Ebola crisis. Risk Management Solutions (RMS), a financial services analytics company has used the CDC model to produce projections of case loads and to estimate dates for reaching the 'tipping point' – where new disease caseloads stop increasing and start to decline, representing roughly the half-way point of the epidemic duration³. Their analysis provides some comfort – the disease is not expected to become a significant mortality threat in other parts of the world, and in all feasible scenarios the epidemic does eventually decline and fade away. The duration of the outbreak has

¹ World Bank Group Ebola Response Fact Sheet, 5 November 2014

² WHO Statistics 22 Oct 2014. 4,148 beds are planned for Guinea, Liberia and Sierra Leone, with 1,206 being currently available.

³ RMS Ebola Event Report #2, 22 October 2014

a wide range of uncertainty, but the projection expects significant daily caseloads to last until March 2015, at the most optimistic, and through to August in the most pessimistic. The range of projections suggest that the current total of 14,618 confirmed cases of Ebola could reach between 88,000 and 1.5 million cases in the region by the end of the outbreak. Epidemiologists are suggesting that we may have lost our opportunity to contain and eradicate the disease, and that there is probably little chance of preventing Ebola becoming 'endemic' – staying in circulation in the population with occasional flare-ups for the foreseeable future.

How Might this Affect US and Europe?

The contagion in West Africa has already resulted in cases arriving in the United States and Europe. There have been 6 known cases outside Africa, mostly healthcare workers returning from the region. The advanced treatment available in US and European hospitals has helped most of these victims survive – only two have died. Stringent public health epidemiology has contained these cases and prevented any wider outbreak in local populations. This has however not prevented some degree of public panic occurring whenever a case of Ebola is reported. Even if the likelihood is extremely remote, the fear of contracting such a virulent disease with its horrific symptoms makes people change their behaviour.

Following the death of a Liberian patient, Thomas Duncan, in Dallas, Texas, on October 8, 2014 the economic consequences of the fear effect induced by Ebola became apparent: Parents kept their children from going to school, the number of diners at restaurants dropped 5% from the same period a year earlier, bars and clubs saw custom reduce by 11% and hotel occupancy was down 7%, as people cancelled business trips and meetings in the city⁴. Not all businesses suffered however: Army-Navy stores in East Texas reported a spike in people buying survivalist equipment such as water purification tablets, gas masks, and emergency fuel⁵.

We can expect more individual cases of this type to occur in US and European cities. Over 200,000 people a month typically fly from the affected region in West Africa to other parts of the world. Air traffic to and from the region has significantly reduced since the outbreak, but global travel and interconnectivity is an essential part of modern business and rates of international travel from the region are slowly returning to pre-epidemic levels. It is almost impossible to prevent population movement in today's globalized economy. Infection rates have already exceeded one case per thousand people in the population of Liberia and Sierra Leone. As case loads grow over the coming months, there is a growing chance that someone who is at an early stage of infection, when the disease shows no symptoms, will be among the thousands of people who travel undetected to other parts of the world and then develop symptoms and fall ill while at their destination. Most of the air travelers from West Africa fly to Europe as a primary hub, and many travel on to other destinations in the rest of the world. Half of transferring travellers go to United States.

Economic Disruption from Virulent Infectious Diseases

The Ebola outbreak has some similarities with previous high virulence, low infection epidemics. We can calibrate the potential effects of the fear factor disrupting business and causing economic harm from historical precedents, including:

Ebola Impact in Dallas, Texas, 2014

The economic impact caused by the reaction of the Dallas population to the high profile Ebola case of Thomas Duncan, is described above. This includes decline of restaurant clientele by 5%, bars and club custom down 11%, and hotel occupancy down 7%. The initial downturn lasted several weeks, and recovery since has been slow, with effects still persisting six weeks later. This represents around a 2% decrease in catering, hospitality and travel business for the quarter.

SARS 2002-2003

The outbreak of a new and virulent virus Severe Acute Respiratory Syndrome (SARS) in 2002 and 2003 killed 775 people, and infected over 8,000, so although terrible it did not ultimately result in a huge death toll. However SARS was virulent and mysterious, with no vaccine or medical treatment for it. It had a high case

⁴ GuestMetrics Data, reported in 'Consumers hunkered down during Dallas Ebola scare', Sara Eisen, CNBC, 27 Oct 2014.

⁵ How a Minimal Ebola Outbreak Will Devastate the U.S. Economy, D Hodges, 13 Oct 2014

fatality rate – around 15% of infected people died, but particularly deadly for older people with a death rate of 50% in patients over 65. The ‘fear multiplier’ was the main consequence of SARS. The economies of the main regions where SARS was prevalent during the few months of the outbreak – China, Hong Kong, Taiwan and Singapore – were badly affected. Hong Kong’s economy fell more than 10% in the worst quarter. Tourism revenues in Beijing halved in their worst month. Personal consumption by the population of Taiwan dropped 8%. Asian currencies sustained big losses as traders converted into the safe haven of US dollars, and there were increases in these economies’ risk premiums in international capital markets.

An even bigger ‘fear multiplier’ applied when a tourist in Hong Kong carried SARS back to Canada and caused a small outbreak there in March 2003. 44 people in Canada died, but 35% of U.S. nationals surveyed at the time felt that it was unsafe to travel to Canada. The economic consequences for Canada were severe: Canadian hotels lost many millions of dollars, a third of the Toronto tourism workforce was laid off, and the Bank of Canada estimates that SARS cut Canadian GDP by 0.6% in Q2 of 2003.

Avian Flu 2005-2006

Highly pathogenic avian influenza, H5N1, is not a transmissible disease between humans, but is caught from close contact with infected poultry, mainly domestic and raised in rural households in Southeast Asia. In 2004 to 2007 there was a rash of cases that spread, mainly through infected wild bird migration, to the Middle East and eventually to Europe. It is highly virulent with a case fatality rate of 60%. The ‘fear multiplier’ from Avian Flu was increased by media concerns that the virus could mutate into a human-to-human transmissible virus and trigger a global pandemic of high mortality. The appearance of individual cases in different locations around the world resulted in localized economic impacts in each community, most notably reduction in consumption. The heaviest impact was to the food industry. Poultry flocks were widely culled, and the public lost confidence in the quality of the food industry, shunning chicken products, but also many other meat and farmed products. The media focus on pandemic preparedness caused localized incidences of stockpiling food and supplies, but there were many cases of localized reductions in consumer spending. Tourism revenues were reported significantly down in Vietnam, Hong Kong, and other countries.

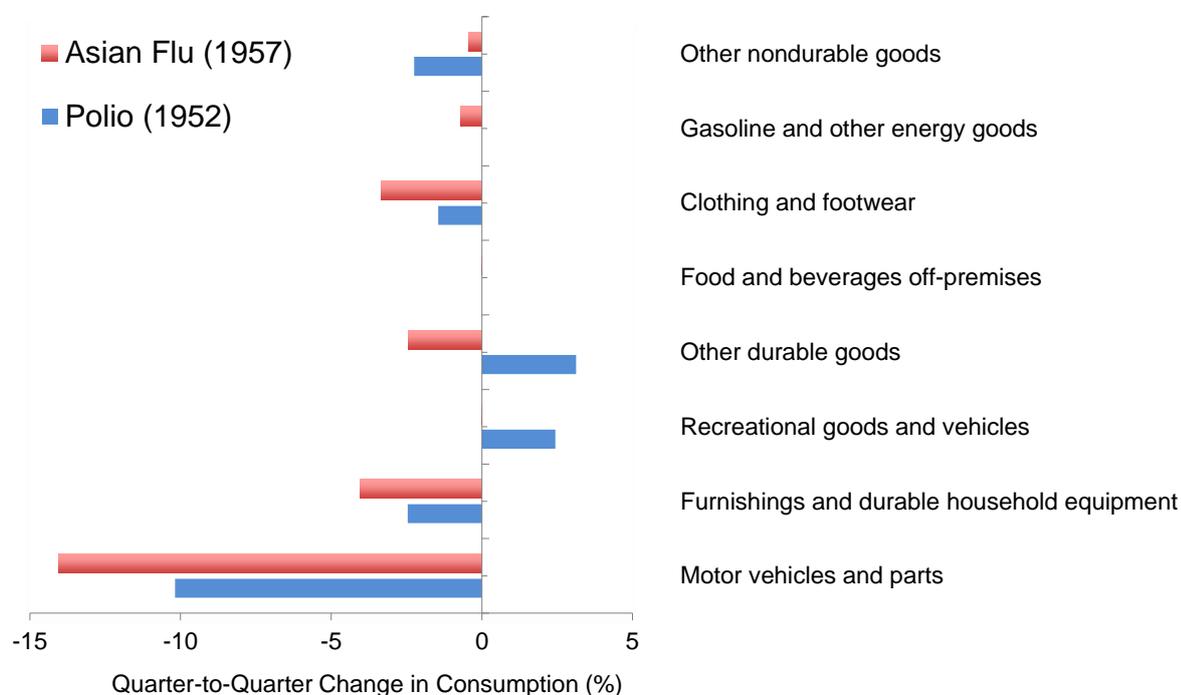


Figure 1 Evaporation of the feelgood economy: Impact of two historical epidemics in suppressing consumption in different economic sectors.

Asian Flu 1957

The influenza pandemic of 1956 to 1958 was caused by a new strain of H2N2, possibly from birds. It was first identified in Guizhou Province, China, spreading to Singapore, Hong Kong, and then United States. The World Health Organization estimates that around 2 million people died. A study of what would happen if an outbreak with the characteristics of the Asian Flu outbreak of 1957 were to occur today suggests that it would lead to world real GDP being 1.4% below baseline in the first year, and nearly 1% below in the subsequent year⁶.

Polio Outbreak 1952

The epidemic of poliomyelitis in the United States in 1952 occurred before there was a vaccine to protect the population. The disease caused crippling paralysis in nearly half of the 57,628 cases reported that year, and around 5% died. It particularly inflicted children, with two-thirds of cases being under the age of 15, and the disease left them mildly or severely disabled. Parents' fears for their children led to a mass withdrawal of school attendance and many schools closed at various points throughout the year. Fear of polio dominated news and social concerns throughout the year, and depressed the US economy temporarily as it was recovering after the war. A contemporary writer noted⁷: *“At the height of the epidemic, the people in Minneapolis were so frightened that there was nobody in the restaurants. There was practically no traffic, the stores were empty. It just was considered a feat of bravado almost to go out and mingle in public.”*

Figure 1 shows reduction in consumption in different sectors of the economy from two examples of fear-factor epidemics. The principle effect is in reducing discretionary spending, purchases of major items, and delays in buying luxury goods. In some cases economists suggest that these purchases are deferred rather than lost, but there are many items of discretionary spending, such as perishables and hospitality that are lost and not purchased again at a later date.

Estimates of Future Ebola Cases in US

A number of disease spread specialists have recently published estimates of the number of cases that could be carried to the United States.

- RMS has estimated that the United States could see 15 to 130 new Ebola cases in the next few months⁸.
- The National School of Tropical Medicine in Texas has estimated between 5 and 100 cases.
- David Relman, Prof. of Infectious Diseases, Stanford University has suggested “it is quite possible that every major (US) city will see at least a handful of cases”.
- The consensus of other estimates is between 2 and 20⁹.

Centre for Risk Studies ‘Contingency’ Scenario

In this current situation, it would be prudent for businesses to plan for contingencies around economic disruption from Ebola cases in US and Europe during the next six months or so. To assist with this, the Centre for Risk Studies has analyzed what the consequences would be to economic activity if there were a cluster of cases in US and European cities.

To be clear, this is not a prediction or an ‘expected’ outcome. It is an analysis of the consequences of the upper bounds of published epidemiological projections. It is intended as a ‘what if...’ exploration for business preparedness planning.

⁶ Economic Scenarios.com, 2006, Issue 13: The financial effects of a bird flu triggered pandemic.

⁷ Richard Aldrich, M.D. quoted in *‘A Paralyzing Fear: The Story of Polio in America’*, by Seavey, N.G., (1998).

⁸ RMS Press Release 3 Nov 2014, “US could see 15 to 130 new Ebola cases”

⁹ Associated Press, Nov 1, 2014, reported in several media.

The Cambridge 'Contingency' Scenario for Ebola consists of:

- Several hundreds of individual cases and clusters of cases in US and Europe. Most major cities have a minor outbreak or a scare that is highly publicized and affects economic activity and public behaviour throughout the entire country.
- United States sees index cases in 20 major cities (cities that account for a third of US national GDP).
- Similar infection patterns occur in the UK, Germany, France, Spain, Italy – index cases in 15 major cities (cities that account for a quarter of these countries' combined GDP)
- These occur sporadically between now and mid-year 2015
- Each localized outbreak is quickly contained and dealt with. There is minimal but occasional contagion within US and European urban populations. The death toll is very low.
- Each outbreak causes localized panic and avoidance of public gatherings, reduction in discretionary travel, reduction in economic activity and consumption
- Consumption decreases for 0.2% for Q1 and 0.1% for Q2 (Similar to Polio outbreak of 1952)
- The supply of labour and labour participation rates drop by 5% for 2Q
- Tourism contributions to GDP drop by 50% by Q2 and recover to 80% by Q4 (Similar to impact of SARS 2003 on infected cities in Southeast Asia and Canada.)
- Economic consequences are felt by each country's trading partners and cascade through the world economy.

Computable General Equilibrium Macroeconomic Model

The analysis of the macroeconomic scenario is carried out using Oxford Economics Global Economic Model (OE GEM)¹⁰, a computable general equilibrium model. The model provides multivariate forecasts for the most important 47 economies of the world with headline information on a further 34 economies. Forecasts are updated each month for multi-year projections.

The OE GEM is best described as an eclectic model, adopting Keynesian principles in the short run and a monetarist viewpoint in the long run. In the short run output is determined by the demand side of the economy, and in the long term, output and employment are determined by supply side factors. The Cobb-Douglas production function links the economy's capacity (potential output) to the labour supply, capital stock and total factor productivity. Monetary policy is endogenized through the Taylor rule, where central banks change nominal interest rates in response to changes in inflation.

Relative productivity and net foreign assets determine exchange rates, and trade is the weighted average of the growth in total imports of goods (excluding oil) of all remaining countries. Country competitiveness is determined from unit labour costs.

The model baseline scenario is the expected trajectory of the economies of the world over the next five years, with all the input economic parameters prior to November 2014 as actuals, and expected best estimates of the key input variables for 20 quarters into the future. This is compared with a scenario where a number of the input parameters to the model are shocked to reflect the potential consequences to key countries, as defined in the Cambridge 'Contingency' Scenario for Ebola summarized above.

Economic Consequences of 'Contingency' Scenario

The key economic consequences of the Ebola scenario include a suppression of consumer spending, a decrease in labour participation, and a large drop in tourism income for the affected countries. This triggers a slow down in economic output and growth in the United States and Europe with economic impacts ultimately cascading to all other countries of the world. Figure 2 shows inflation projections for the scenario, using consumer price index, for three key example countries, US, UK and Germany. The deflationary phase in the economy lasts for two years, followed by an inflation boom, towards the end of year 3.

¹⁰ Oxford Economics Global Economic Model (GEM) November 2014. OE GEM is the most widely used commercially-available international macroeconomic model with clients including the IMF and World Bank.

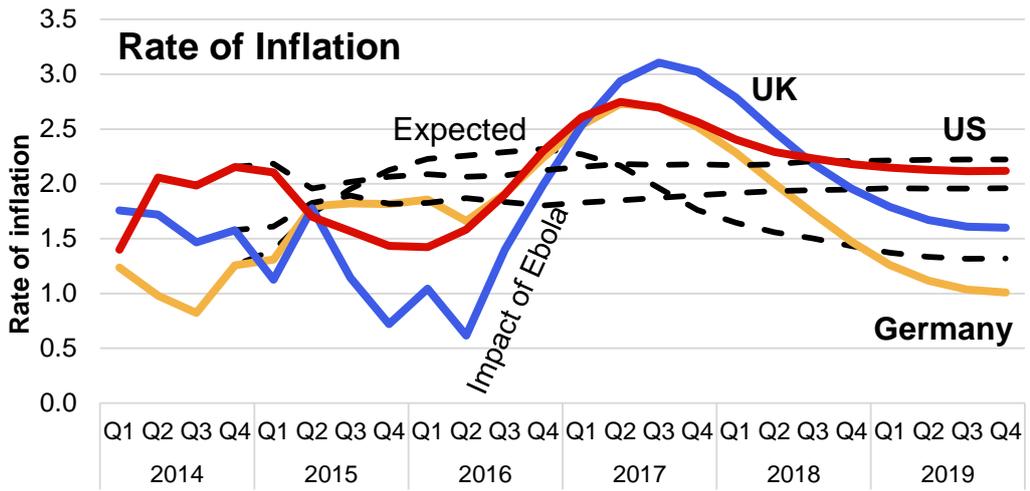


Figure 2: Inflation projections resulting from the Ebola Contingency Scenario (relative to baselines, shown as dotted lines).

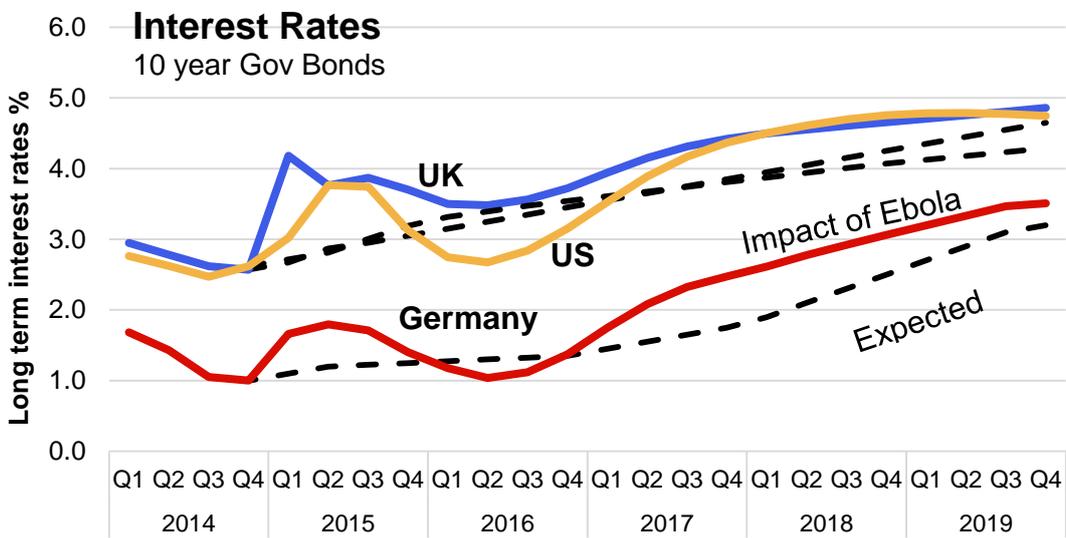


Figure 3: Interest rate projections resulting from the Ebola Contingency Scenario (relative to baselines, shown as dotted lines).

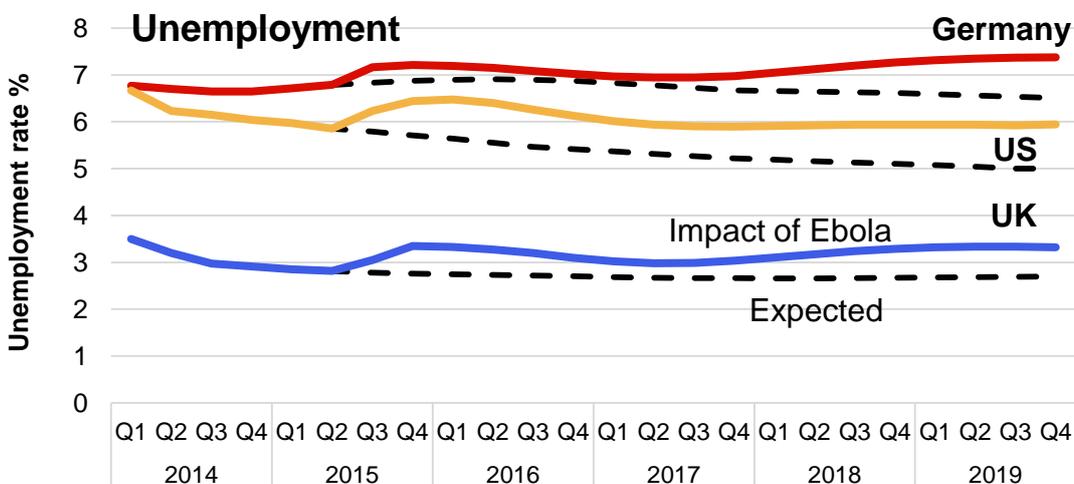


Figure 4: Unemployment projections resulting from the Ebola Contingency Scenario (relative to baselines, shown as dotted lines).

Figure 2 shows the expected change in the rate of inflation over the period of the outbreak. Lower consumption, low labour participation rates put downward pressure on inflation rates. By 2016 Q2 the initial panic from the infection has subsided and monetary policy is used by central governments to stimulate growth.

Figure 3 shows the projections for interest rates, which are expected to rise and fall to counter the deflationary and inflationary cycle, increasing interest rates above baseline for many countries by the end of the five year analysis.

Figure 4 shows the consequences in terms of the impact on unemployment rates, which increase in all territories analyzed.

The deflationary and negative impacts on the economies of US and the five countries in Europe are reflected in an overall loss in their gross domestic product (GDP). The modelled loss of GDP, relative to the GDP output that would be expected without the occurrence of the scenario – i.e. the ‘GDP@Risk’ from this scenario – is summarized in Table 1.

Ebola Contingency Scenario Could Cost World’s Economy a Trillion Dollars

| | 2015 GDP@Risk | | Next 5 Years GDP@Risk | |
|------------------------------------|----------------------|--------------|-----------------------|--------------|
| | Total US\$ | % of Total | Total US\$ | % of Total |
| United States GDP Loss | 0.28 Trillion | 1.68% | 0.32 Trillion | 0.36% |
| Europe (DE, FR, UK, IT, ES) | 0.21 Trillion | 1.71% | 0.62 Trillion | 0.97% |
| Global GDP Loss | 0.76 Trillion | 1.05% | 1.43 Trillion | 0.36% |

Table 1 Estimated loss of GDP in the six affected countries and consequential effect on the world’s economy, as a result of the Ebola Contingency Scenario

The six countries analyzed in this scenario have a combined economic loss of \$490 Billion in the year of the outbreak. These countries recover from the economic damage, but their recovery takes several years, and the consequences result in lower economic output than would otherwise have been expected, resulting in lost output over five years of more than 1.4 Trillion dollars (\$1.43Tr).

Across all the six countries analyzed the US has the largest first year impact losing 1.68% of potential output with a 5 year GDP@Risk of 0.36% loss compared to its potential output. In Europe the first year GDP@Risk is 1.71% loss in potential output compared to a 5 year GDP@Risk value of 0.97% of potential economic output. This suggests the US is able to recover much faster than Europe from the Ebola outbreak scenario.

The six countries analyzed represent four of the six largest economies in the world, and six of the largest 13 economies in the world. Combined they account for 39% of global GDP. They have significant trading relationships with all of the other major national economies in the world. The impact of an economic downturn in the six countries has knock-on effects depressing the economies of their trading partners. Within the first year of the outbreak the economic contagion accounts for another \$270 Billion of loss in potential economic output across all other countries of the world. Countries with the strongest trading relationships with those directly impacted take the major share of this loss. There is some longer term loss to the unaffected countries, totaling \$490 Billion over the full five years of the projection.

Comparison with economic impact of other pandemics

Overall the economic impact from the scenario results in \$1.43Trillion of lost output in the global economy. For context, the Cambridge Centre for Risk Studies has analyzed a different hypothetical scenario – the São

Paulo Virus Pandemic Scenario¹¹ – which is a highly infectious, but only moderately virulent disease: an influenza pandemic that infects 43% of the population and results in 19 million deaths. The economic consequences of this scenario is estimated at between \$7 and \$15 Trillion. The Ebola scenario has the potential to cause economic impact that is almost one one-fifth of the estimated consequences of a global pandemic highlighting the importance of fear in economic activity. Another reference point is that of the Great Financial Crisis of 2007-2012 caused loss of output relative to the trend of global growth prior to the crisis of \$18 Trillion. Scaled to current GDP values this would be a GDP loss of \$20 Trillion.

Could the population overcome their ‘fear multiplier effect’?

The forecast of a potential economic loss of the order of a Trillion dollars may seem a high estimate of the consequences from what is ostensibly a relatively small number of individual disease cases. The major impact that drives these conclusions is the fear multiplier in the reaction of the population to outbreaks in their communities. The level of reduction in consumption that we assume in the analysis is well documented in the precedent studies where virulent diseases have caused disruption to the economies of localized communities and regions. A reduction in tourism trade is also well documented from pandemics and accounts for a growing share of aggregate GDP, as shown in Figure 5. Even small decreases in numbers from external visitors can have significant economic impacts. Fear of human contact will also lead to people staying at home and taking ‘sick days’. With modern technology, most jobs can now accommodate flexible working conditions (i.e. telecommuting) but significant share of jobs still require physical presence. It is plausible that some businesses will also close during peak fear. In this scenario we have assumed that this level of impact would be replicated in each location where there is an outbreak, and that as a consequence each country would suffer an overall effect to its national economy. It is possible that multiple outbreaks in many different cities could engender a different attitude in the population – perhaps with enough cases people would become accustomed to the occurrence of Ebola outbreaks and shrug it off, accepting it as a routine peril of life, and result in minimal economic impact.

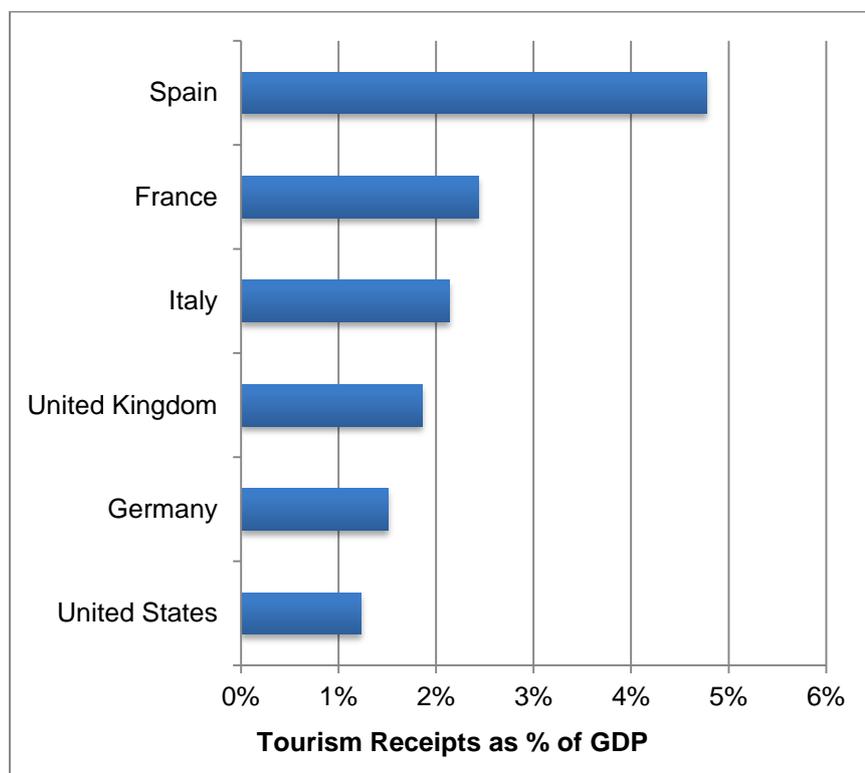


Figure 5: Tourism receipts as percentage of total GDP output (2012)

¹¹ *Stress Test Scenario: São Paulo Virus Pandemic*, Cambridge Risk Framework Series, Centre for Risk Studies, 2014.

Not a 'worst case' scenario

Conversely, for modelling simplicity, we have made the assumption that outbreaks are confined to only six countries. If Ebola transmission does start to become an occasional occurrence outside of West Africa, it is unlikely that it will be confined to only these areas. If there are outbreaks in other countries – perhaps in Southeast Asia, China, Japan, Australia, and other major economies, the localized impacts in each of these cases could be significantly worse than the impacts from the six countries that we have modelled.

If Ebola does spread outside of West Africa, there is a possibility that outbreaks could take hold in other locations similar to West Africa with dense populations that have cultural practices that engender spread and poor healthcare facilities to treat and contain the outbreak. This could create more locations of endemic Ebola throughout the world, that firstly could devastate the local economies of emerging markets, and secondly could in turn be reservoirs for repopulating continuous outbreaks of Ebola cases in United States, Europe, and other major economies.

The Ebola Contingency Scenario we have analyzed here has severe consequences for the major economies of the world, and for the global economy as a whole. The fear multiplier causes surprisingly large impacts on local economies, from relatively low incidence of virulent infections in the community. However, severe as this may seem, this scenario shouldn't be taken as a 'worst case scenario' – the potential for wider geographical incidences across more countries and the outside chance that new endemic reservoirs could be created elsewhere in the world would be significantly worse than the scenario analyzed here.

How Much Would it Have Cost to Have Contained it?

It is worth noting that public health specialists believe that this current disease outbreak could have been contained and eradicated with sufficient resources, if applied sufficiently early in the outbreak.

| Date | Cost Estimate Appeal |
|--------------|----------------------|
| April 2014 | \$4.8 million |
| July 2014 | \$100 million |
| August 2014 | \$500 million |
| October 2014 | \$1 Billion |

Table 2: Escalation over time of World Health Organization cost estimates to contain Ebola outbreak in West Africa, in their appeals to national governments for assistance.

The World Health Organization made an initial appeal in April 2014 for \$4.8 million to combat the first cluster of cases, but as the number of infected people spread exponentially, so did the costs. By July the eradication cost estimate had escalated to \$100 million. Table 2 shows the cost inflation over time that the World Health Organization estimated was needed for each of its international appeals to national governments for assistance. The current estimate and appeal stands at \$1 Billion. As of 15 October, the World Health Organization was reporting that only \$257m had been received, with another \$162m pledged – i.e. only a third of the resources needed has currently been raised.

This raises some important principles for the protection of the international community. Clearly spending \$100 million to prevent a potential loss to the world economy that could escalate to over a Trillion dollars in lost economic output, should be an easy and uncontroversial decision, apart from the issue of who should pay. The national economies and healthcare systems of Liberia, Sierra Leone and Guinea were unable to afford this level of resource. No individual country has felt it was their sole responsibility, and generating this level of contributions from a collective of the international community has been a difficult and slow process.

The principle of coordinated action by sovereign nations for the collective good needs better processes and institutions than those that currently exist. This is self-evident in examples such as this, where an emergent disease in a remote jurisdiction poses a systemic threat to the global economy. It may also be true of global systemic threats more generally, in examples such as financial crises, cyber catastrophes, and environmental catastrophes. In the aftermath of the Ebola crisis, we will need to create new international funding mechanisms and decision-making infrastructure to ensure that the next crisis of this type receives prompt and adequate resources to contain the threat, when it is most cost-effective to do so.

What Should Your Ebola Contingency Plans Be?

Management of the risk of epidemics requires recognition of the wide range of types and severities of infectious diseases that can occur. Business risk preparedness plans are described in more detail in our report on pandemic threats, published earlier this year¹². A global organization should expect to have to manage a crisis from a localized disruptive infectious disease epidemic somewhere in one of the territories where it does business, on average every few years.

The spectrum of potential infectious disease events is varied, and can trigger events of severity ranging from mild and localized, to catastrophic and global. Managing the risk of infectious diseases means being prepared for a range of potential manifestations, of which the current Ebola crisis is just one example. Our hypothetical scenario of a global pandemic like São Paulo Virus represents a different set of consequences from disease spread – where high absenteeism is more of a business disruption challenge than this fear factor that impacts the economy when there are outbreaks of virulent diseases. The objective of considering different stress test scenarios is to enable resiliency strategies to be identified across a range of potential crises that could occur.

The current Ebola outbreak will play out over the next several months. It is unlikely that the scenario we have analyzed here will come about – we have picked the upper end of the wide range of epidemiological projections. But we offer this as a ‘contingency’ business planning scenario. We suggest that this is not a ‘worst case’ scenario (it could be worse with wider geographic incidence of cases, or with new endemic reservoirs of disease elsewhere in the world) but it is a severe plausible outcome that could occur over the next several months. We argue that it would be prudent for businesses to have contingency plans in place that will reduce the impact of the outcome if it were to come about.

Contingency plans might include some or all of the following:

- Have communication plans in place to inform your employees and counterparties of the safety measures you propose to take, the actions and procedures you propose to follow during the crisis period. These might include routinely checking up on the health status of any absent staff in case they have contracted the disease and have put at risk other employees in their workplace. Help dispel myths and over-anxiety about the outbreak by providing clear and science-based advice.
 - Communication plans should be proactive to combat the fear effect, and to put the risks of infection in a sensible context, while establishing reassuring measures that demonstrate that public safety is being taken seriously in the workplace
- Prioritize the protection of your workforce, customers and visitors
 - Ensure work practices are safe for employees – minimize needs for physical contacts particularly with general public.
 - In the unlikely event of an employee suffering a suspected case of Ebola, colleagues and contacts will need to be quarantined. Measures will be needed to identify the work colleagues and contacts of anyone who falls ill with symptoms consistent with the disease.
 - However processes should avoid contributing to the Ebola hysteria. Ebola is spread by close physical contact, not airborne infection. Protection measures need to reinforce the message that it can only be caught by direct contact, not through surfaces or door handles.
- Expect absenteeism. Keep careful track of attendance and implement a buddy system to have staff check on each other. Prepare for the potential of essential departments and functions being understaffed for a

¹² *Stress Test Scenario: São Paulo Virus Pandemic*, Cambridge Risk Framework Series, Centre for Risk Studies, 2014.

period of time. Have additional 'overlap' staff who have skills and training to perform tasks in essential departments and functions.

- Expect disruption to your processes, suppliers, and consumption of discretionary products and services.
 - Have business continuity plans ready and updated, including alternative suppliers, stocking greater inventory, stockpiling items
 - Implement higher tolerance of credit risk from counterparties
- Ensure insurance cover for travel cancellation, event cancellation insurance, and other protection is adequate and covers the business for this loss causes.
- Where the company manages investment assets, be ready to switch to conservative investment strategies for financial portfolio resilience.
- Give generously to Ebola containment charities.

Conclusion

Over the next several months the Ebola outbreak is likely to provide more examples of how the fear multiplier will ripple through the global economies of the world. Any location where a reference case shows up will experience a fear factor chill on its local economy and businesses can expect disruption as a result. In severe examples, corporations may have to deal with localized offices or regional operations faced with business continuity issues from high levels of absenteeism, disruption to their markets, failures in their supply chain, and distraction in their trading partners. Having clear risk management guidelines in place before an event occurs is much preferable to improvising responses when one occurs.

The threat of new diseases in distant populations may seem of little relevance to a global business in an era of medical miracles, but our interconnectivity and human nature's innate fear factor is strong enough to make these outbreaks a genuine risk and potentially cause significant economic disruption. All businesses should have risk management processes in place for events of this type.

This Ebola Contingency Scenario is offered as a contribution to improving business resilience.