

The business effects of pandemics – a rapid literature review

ERC Insight Paper

April 2020

The business effects of pandemics – a rapid literature review

Joanne Turner

Joanne.E.Turner@wbs.ac.uk

Enterprise Research Centre
Warwick Business School

Temitope Akinremi

Temitope.Akinremi@wbs.ac.uk

Enterprise Research Centre
Warwick Business School

The Enterprise Research Centre is an independent research centre which focusses on SME growth and productivity. ERC is a partnership between Warwick Business School, Aston Business School, Queen's University School of Management, Leeds University Business School and University College Cork. The Centre is funded by the Economic and Social Research Council (ESRC); Department for Business, Energy & Industrial Strategy (BEIS); Innovate UK, the British Business Bank and the Intellectual Property Office. The support of the funders is acknowledged. The views expressed in this report are those of the authors and do not necessarily represent those of the funders.

CONTENTS

CONTENTS..... 3

ABSTRACT..... 4

1. INTRODUCTION..... 5

2. PREVIOUS PANDEMICS AND THEIR EFFECTS ON BUSINESS .. 6

3. COVID-19 – A PRESENT-DAY PANDEMIC..... 12

4. COVID-19 IMPACTS ON CHINESE SMES 13

5. COVID-19 AND CHINESE SUPPLY CHAINS 16

6. SMES AND PANDEMIC PREPAREDNESS..... 18

REFERENCES..... 21

ABSTRACT

This review considers the existing evidence on the business effects of pandemics, with a particular focus on the impact on small and medium enterprises (SMEs). Evidence from previous pandemics is reviewed, and in addition, we provide an overview of early assessments of the emerging evidence on the business impacts of the COVID-19 pandemic on Chinese firms and other related businesses.

Evidence on the 1918 influenza pandemic in the US suggests higher mortality in urban areas and higher working-age mortality – a very different pattern to COVID-19. Shutdowns did cause significant losses for many businesses, especially those in the service and entertainment industries that suffered double-digit losses in revenue. Other businesses that specialised in health-care products experienced gains in revenue. The 1918 pandemic caused labour shortages in the US as well as longer-term productivity benefits. These were not repeated in other countries. Scenario-based studies for the US and UK have also examined potential pandemic effects and may provide a more robust indication of potential medium-term effects from COVID-19.

Early evidence from the COVID-19 pandemic in China emphasises the severity of the short-term effects on SMEs. In February 2020, 30 per cent reported that, due to a cash shortage, they would be able to sustain their business for no more than three months; 30 percent reported that they would be able to sustain their business for six to twelve months. Furthermore, 30 per cent of firms have seen their income fall by more than 50 per cent, with almost a third reporting a 20 to 50 per cent reduction. Three months after the COVID-19 outbreak in China, many small businesses are not working at full capacity. Many employees continue to work from home, and business owners attempt to fix broken supply chains and look for new domestic and overseas contracts. Estimates suggest that each ten-day period of lost work in the Chinese economy reduces quarterly GDP growth by 0.39 to 0.46 percent.

1. INTRODUCTION

This review considers the existing evidence on the business effects of pandemics, with a particular focus on the impact on small and medium enterprises (SMEs). Evidence from previous pandemics is reviewed, and in addition, we provide an overview of early assessments of the emerging evidence on the business impacts of the COVID-19 pandemic on Chinese firms and other related businesses.

All businesses will be impacted by the COVID-19 pandemic, most negatively, some positively. The importance of understanding the effects of the COVID-19 pandemic on SMEs specifically stems from three main factors. First, larger firms with more significant financial resources may be better able to survive shocks than SMEs, which are often characterised as having limited resources and structural features that expose them to risks that may be detrimental to their business (Verbano and Venturini, 2013). The risk of an extreme event, or ‘an environmental jolt’ (Meyer, 1982) exposes an SME to higher levels of strategic uncertainty which impacts upon its every-day activities and may, in some cases, threaten its survival (Sullivan-Taylor and Branicki, 2011). Second, operating across a wide range of sectors, failures among SMEs have the potential to impact upon the normal functioning of daily life, be it through the disruption of service provision, or through the many supply-chain networks which exist (Sullivan-Taylor and Branicki, 2011). SMEs also play a crucial part in terms of social inclusion, local employment and innovation in rural and less-favoured areas (Auzzir et al., 2018). Third, SMEs have disproportionately driven job creation since 2010 (Nesta, 2017), and the dynamism of the SME sector will be critical to re-building growth post-crisis.

2. PREVIOUS PANDEMICS AND THEIR EFFECTS ON BUSINESS

A pandemic impacts both supply and demand (Swift, 2009). The number of hours worked falls sharply due to illness and fear of infection, reducing aggregate supply. Lockdowns lead to lower retail sales and drastically reduced leisure activities (visits to sporting events, restaurants, theatres etc.). Government intervention to halt the spread of a virus affects supply chains, which in turn impacts upon international trade. Firms experiencing falling sales and production experience falling profits due to fixed short-term costs and falls in revenue. Effects are sectorally specific: hospitality and personal services are most adversely affected, whereas the pharmaceutical and medical-equipment sectors are likely to benefit most.

Previous studies examining the business effects of previous pandemics, and in particular, the effect on SMEs, are extremely limited. Typically, economic analysis of pandemics focuses on macroeconomic indicators, for example GDP, rather than micro or firm-level effects. Predictions of the economic and social costs for a present-day pandemic are often based on the influenza pandemic of 1918 (termed 'Spanish Flu'¹) (Garrett, 2007, 2008, 2009). The 1918 pandemic killed 40 million people worldwide from the early spring 1918 through to late spring 1919. In 2005, the World Bank suggested that a similar (current) influenza pandemic could cost the world economy \$800 billion and kill tens-of-millions of people, with long-run costs being much greater².

In the US, the impact of the 1918 pandemic was not uniform across regions. Although some regions were able to take precautions, such as closing schools and churches to limit the spread of infection, there was a positive correlation between population density and deaths – a statistic supported by cities within US states registering higher mortality rates than rural areas (Garrett, 2007, 2008). In addition, white people were struck relatively harder by the influenza pandemic than non-white people. At the time, the majority of the urban population (having a higher population density than rural areas) was white (over 90 percent). Furthermore, mortality rates were highest for those aged

¹ The influenza pandemic was termed the 'Spanish Flu' because Spain had one of the worst outbreaks of the disease, with nearly 8 million people infected by early 1918 (Potter, 2001).

² Brahmhatt, M. speech, 23 September 2005, Washington D.C. "Avian Influenza: Economic and Social Impacts."

18 to 40, and for males within this age group. This is markedly different to the pattern in the COVID-19 pandemic.

Literature examining the economic effects of the 1918 pandemic is based on printed media due to the lack of available economic data. Newspapers reviewed in Garrett (2007, 2008) suggest that firms in one US state saw their businesses decline by some 40 to 70 per cent. Average business losses were more than \$100,000 per day (2006 prices). Many businesses, especially those in the service and entertainment industries, suffered double-digit losses in revenue. Other businesses that specialised in health-care products experienced an increase in revenues.

Mortalities reduced the supply of labour, increasing the marginal product of labour and capital per worker, in turn increasing real wages. Those US states that experienced a higher number of deaths per capita experienced higher rates of growth in per capita income following the pandemic. After the pandemic, the increase in capital per worker resulted in higher output per worker and higher incomes (Brainerd and Siegler, 2003). There were also implications for economic activity decades after the pandemic as pregnant women who were exposed to influenza in 1918 gave birth to children who had medical problems later in life, such as schizophrenia, diabetes and stroke (Almond, 2006), reducing the future supply of labour and increasing future health-care costs.

Reasonable inferences about the economic and social consequences of a modern-day pandemic can be made based on these 1918 pandemic effects. Deaths may be related to race, income and place of residence, with higher mortality rates likely among densely-populated areas within cities which are likely to have a higher number of low-income and ethnic-minority groups than suburban or more-rural areas. Lockdowns and quarantines would hurt businesses in the short run. Some firms could lose a large proportion or all of their revenue (for example restaurants), whereas others could experience an increase in business (for example online-delivery firms). However, it seems unlikely given the nature of the mortality profile that the COVID-19 pandemic will result in labour shortages of the type present during the 1918 pandemic.

Not all literature exploring the 1918 pandemic yields consistent results. Karlsson et al. (2014) examined the short-term and medium-term economic consequences in Sweden. Econometric results suggest that the pandemic led to an immediate negative effect on earnings rather than the theoretically-predicted increase as suggested in Garrett (2007, 2008) as well as a rapid decline in capital returns.

Since 1918, there have been several other pandemics which have impacted on economies around the world. Rassy and Smith (2013) examine the effect of the H1N1 influenza pandemic ('Swine Flu') on the Mexican tourist and pork industries during spring 2009. Several nations imposed travel restrictions to Mexico, which led to reduced demand and cancellations. Many airlines cut their flight frequencies to Mexico City or suspended flights for at least a month. At the time, tourism, Mexico's largest service sector, was recovering from the global financial crisis of 2008, but the H1N1 pandemic brought the industry to a standstill. Reports that the H1N1 virus originated from swine led consumers to cut back on pork consumption. Domestic demand plummeted, and countries around the world banned imports of Mexican pork.

The economic consequences of the H1N1 pandemic in Mexico were short-term. By the end of 2009, arrivals, revenue and hotel occupation in most destinations had recovered. Pork production targets for 2009 were met, and as consumer confidence was restored and demand recovered, Mexico's imports regained their pre-H1N1 trend by the end of July 2009 (Rassy and Smith, 2013). The effect of the H1N1 pandemic on the tourism and pork industry in Mexico are likened to the economic effects experienced by Southeast Asian nations following the SARS outbreak in 2003 or by the UK after foot and mouth disease (FMD) in 2001 and the bovine spongiform encephalopathy (BSE) outbreak during the early 1990s (Rassy and Smith, 2013).

Brahmbhatt (2005) examines the social and economic impact of the Avian flu in East Asia – a human pandemic similar to the 1918 influenza pandemic. Findings indicate direct economic costs on the poultry sector due to losses from the disease and control measures put in place. Poultry losses mean financial losses to farmers and impacts the poultry supply chain and the sector as a whole with a 15 per cent economic loss in poultry output in Vietnam envisaged to amount to approximately 0.1 per cent of GDP. Also, distributional effects from the loss of livelihood by poultry dependent rural communities and loss of profits and capability by industrial and commercial poultry producers represent potential impacts of the pandemic. Findings on the potential impact of an influenza pandemic suggest a concurrent decline in global aggregate demand and international trade leading to a further decline in national income and output. The magnitude of this loss is estimated to cost \$1.5 to \$2 trillion (2005 dollar value), representing some 5 per cent fall in global GDP over one year. In addition, uncoordinated control measures to avoid infection may result in a severe demand shock especially for service sectors like tourism, retail sales, hospitality and mass

transportation. Also, the potential effect of workplace absenteeism, disruption in business activities and production processes and a change from business as usual to more costly procedures may lead to supply shocks which may impact supply chains at the national and global level. Emergency public and policy measures such as quarantines and restrictions on travel and trade imposed by governing authorities to slow or mitigate the pandemic may also lead to supply chain disruptions and a temporary breakdown of local and international trade and logistic services. Besides the imminent cost associated with disruptions, the effect of illness and mortality caused by the pandemic could lead to potential losses due to a reduction in labour supply and productivity worldwide. This effect is however dependent on the demographic impact (affected age group), ease of transmission and virulence of the disease. Other economic impacts stem from the cost of hospitalization and medical treatment. At the firm level, findings indicate that resilient firms are more likely to get through the characteristic steep downturns in demand and cash flow caused by the pandemic with relatively less financial damage. These would be firms that have grown over the years with strong balance sheets and a six-month to two years available cash flow. Firms in exposed sectors such as tourism, hospitality and aviation that lack such capabilities may experience a surge in bankruptcy.

McKibbin and Sidorenko (2006) model a range of scenarios (mild, moderate, severe and ultra) using the USA to explore the implications of a pandemic influenza outbreak on the global economy. The four scenarios mimic the 1968-69 influenza 'Hong Kong flu' (mild), the 1957 influenza 'Asian flu' (moderate), the 1918-19 influenza 'Spanish flu' (severe) and the 1918-19 influenza 'Spanish flu' without the anomalously high elderly survival rates (ultra). Findings from the study indicate different degrees of impact on the global economy with a mild scenario estimated to lead to a 1.4 million mortality and a global loss of approximately \$U330 billion (2006-dollar value) in economic output. This amounts to a loss of 0.8 per cent of GDP. The findings also suggest increasing global economic cost as the scale of the pandemic increases. Thus, the ultra-scenario emerged with the highest economic cost capable of causing an economic downturn which may cost up to 142.2 million deaths and a global GDP loss of up to \$US4.4 trillion (12.6 per cent). Furthermore, the composition of the magnitude of economic slowdown differs across different economies with global capital moving from affected economies to less affected ones. Also emerging from the result is the effect of the pandemic on labour markets. Increasing mortality and morbidity leads to a decrease in labour supply and marginal capital product decreases especially for countries experiencing the most capital

shock. It is envisaged that decreasing output will result in slower global growth, and financial capital will move from the most affected economies to the less affected ones.

Keogh-Brown and Smith (2008) analyse the macro-economic impact of the 2003 Severe Acute Respiratory Syndrome (SARS) outbreak. Of the approximately 10,000 infected population, a mortality of 10 per cent is reported. Anomalies in national statistics corresponding to the timing of the SARS outbreak are used as pointers to the actual macro-economic impact of SARS in the estimation. The units of assessment for the estimation are country and economic sector. Countries included in the estimation are those with at least five WHO (World Health Organisation) reported cases of SARS (16 countries). The effects of the pandemic are captured as losses or gains that occurred at the time of the SARS pandemic in either the second quarter of 2003 or 2003 annual data. Findings from the study indicate that the largest economic impact of SARS is related to overall GDP and investment. Also, the most affected sectors were hotels, restaurants and tourism. China and Hong Kong had the highest record of losses with minor effects recorded in Canada and Singapore. These losses, however, did not have long-term effects as they were mostly succeeded by equivalent gains in the following month, quarter or year. Hence, the impact of the SARS pandemic was only marginal after a year.

Smith et al. (2011) also estimate the economic impact of pandemic influenza in the UK using scenario modelling. A single country Computable General Equilibrium (CGE) open-economy model is developed to estimate fatality rates for three influenza scenarios (mild, moderate and severe) alongside the cost estimates of the impact and associated policies. The CGE estimations allow for a disaggregated finance sector to reflect elements of financial services. Overall, the model consists of twelve industry sectors (agriculture, food, materials manufacturing, wood and paper manufacturing, chemicals manufacturing, utilities and construction, retail hotels and restaurants, transport and telecommunications, banking and investment, other business services and other services)) with the finance sector aggregated together with the other sectors and industries. The scenarios are based on previous influenza pandemics that occurred in 1918, 1957 and 1968/69. Findings indicate that at a macro-level, the impact of the influenza pandemic itself is lower than the effect of the mitigation policies put in place to combat the disease. The combined effect of school closure and preventative absenteeism led to a cost impact of 1.1 per cent (£14.7 billion), 1.3 per cent (£16.3 billion) and 1.4 per cent (£18.5 billion) respectively for the three modelled scenarios. Cost

estimates indicate GDP reduction of 0.3 per cent (£3.5 billion), 0.4 per cent (£5 billion) and 0.6 per cent (£7.4 billion) for the mild, moderate and severe scenarios respectively. The most severe sensitivity scenario yielded a GDP loss of 2.9 per cent (£37.4 billion), 3.2 per cent (£41.4 billion) and 3.7 per cent (£47.5 billion).

3. COVID-19 – A PRESENT-DAY PANDEMIC

The current (2019-2020) COVID-19 pandemic which originated in Wuhan, China, in December 2019 has so far been reported in 209 countries and territories, and as of 10th April 2020, has resulted in approximately 95,800 deaths³. The pandemic has led to severe global socioeconomic disruption, the postponement or cancellation of sporting, religious, political and cultural events, and widespread shortages of supplies exacerbated by panic buying.

In China, a fall in consumption combined with interruptions to production has disrupted global supply chains affecting firms across the world (Fernandes, 2020). Previous pandemics such as SARS (severe acute respiratory syndrome) and the 1918 ‘Spanish Flu’ may provide some indication to the economic effects of COVID-19, however, the evidence suggests that the current pandemic is very different to those previously experienced. The spread of COVID-19 has seen economies struck by a simultaneous demand and supply shock, with there being no correlation between economic impact and mortality rates (Fernandes, 2020).

The effects of COVID-19 will be felt disproportionately across an economy. Some sectors may benefit financially, while others will suffer huge losses. Those countries with more service-oriented economies will be more negatively affected, and suffer larger negative employment effects. Hospitality-related sectors have been hit hard – tourist destinations are deserted, airlines have grounded fleets, holidays have been cancelled and hotels have closed. The world stock market has also suffered since the outbreak of COVID-19. The oil gas and coal businesses have seen huge losses (50 per cent below the start-of-year prices, on average), driven by a fall in the price of oil and a reduction in consumption (Fernandes, 2020).

³ Centre for Systems Science and Engineering (CSSE) at Johns Hopkins University (JHU): Coronavirus COVID-19 Global Cases
<https://gisanddata.maps.arcgis.com/apps/opsdashboard/index.html#/bda7594740fd40299423467b48e9ecf6>

4. COVID-19 IMPACTS ON CHINESE SMES

By the end of January 2020, the COVID-19 outbreak, mass quarantine, and international travel ban had begun to severely affect China's economy (Bouey, 2020). Prior to the outbreak, the domestic consumer market combined with the service sector contributed more than half of China's GDP. As the disease spread, many sectors began to see a fall in demand, most notably the automotive and smartphone industries (MckinseyGlobal Institute, 2019a). Travel/tourism, hospitality, entertainment, and the financial industry also suffered terribly during the initial phase of the outbreak (Han et al., 2020).

Lost revenue in both retail and food services during the Chinese New Year week is reported to be RMB 1 trillion (\$142 billion) (The Star, 2020), with service-sector losses during the same period expected to be 1 per cent of lost GDP growth in the first quarter (Luohan Academy, 2020). Businesses relying on physical space and shops, such as supermarkets, traditional food markets, restaurants, car dealers, theatres, gyms and bars, suffered losses, whereas local convenience stores and online businesses and health-related businesses experienced an upsurge in demand (hand sanitizer and personal protection equipment, for example). In a survey of 761 business owners by the University of International Business and Economics in February 2020, 30 per cent reported that, due to a cash shortage, they would be able to sustain their business for no more than three months, and 30 percent reported that they would be able to sustain their business for six to twelve months (Long and Feng, 2020). Half of all businesses surveyed expected to lose 10 to 30 percent of revenue in the present year. A survey of 995 Chinese SMEs⁴ in February 2020 indicates that 30 per cent of firms have seen their income fall by more than 50 per cent, with almost a third reporting a 20 to 50 per cent reduction (Bouey, 2020). More than one third of firms reported that they could stay open for one month with their current cash flow, one third could sustain two months, and less than 10 per cent could stay open for more than six months. Firms indicted that they felt financial pressure from salary, rent and loan-payment demands.

To identify which importing and exporting firms are potentially most vulnerable to the economic slowdown brought about by the spread of COVID-19, Jandoc et al. (2020) use Philippine firm-level data on trade transactions that has been matched with manufacturing-firm survey data for the 2013 to 2019 period. Findings suggest that SMEs

⁴ In China, an SME is defined as having fewer than 2,000 employees.

do not have the capabilities to withstand the COVID-19 shock. Unlike larger globally-oriented manufacturing firms, SMEs that import and export focus mainly on primary food products and intermediate goods. They export food and food products that are highly perishable and sensitive to short-term variations in global demand. SMEs are affected in the short run, and as many do not have the capabilities of large firms (immediate access to credit, for example), they may not be able to withstand the COVID-19 economic shock.

A recent study by Dai et al. (2020) identifies the firm-specific impact of the COVID-19 pandemic in China. The study is SME focused and examines production resumption and challenges being faced by SMEs in light of the disruptions and instability caused by the pandemic. The study employs the use of surveys and interviews to explore the condition of SMEs amidst the COVID-19 outbreak. Findings indicate that 80 per cent of surveyed firms were yet to resume production at the time of the survey while 40 per cent were unable to determine a definitive timeframe for production resumption. Economic stagnation emanating from measures imposed to control the spread of the pandemic and mitigate its impact means that firms are unable to resume business activities. This places a major strain on cash flow availability as firms still have to cater for fixed costs such as wages, rents and taxes. Such firms may be pushed towards bankruptcy as they run out of cash and are unable to run the business. As an implication of this effect, 20 per cent of surveyed firms are unable to last past a month on a cash-flow basis, and only 64 per cent of surveyed firms can last beyond three months. Thus, an extended duration of the pandemic may lead to a surge in SME bankruptcies.

Results also indicate differing barriers to business operations along the supply chain. While upstream firms were mainly affected by labour shortages, their downstream counterparts were faced with declining consumer demand and shortages of raw materials from supply chain disruptions. Upstream firms by nature of their position in the supply chain and business activities are able to benefit from economies of scale and a large capital structure. This differs from downstream firms that are often labour-intensive SMEs. Downstream firms provide goods to consumers and as such, a change in the consumer behaviour can have adverse effects on the profitability of the supply chain link. As such, at the upstream end of the supply chain, the light industry faces the challenge of raw material shortages with 70 per cent of firms indicating it as a problem. Results from the service sector indicate that less than 40 per cent of firms had a similar challenge. Over 50 per cent of firms in business services, light industry and residential service sectors were experiencing declining consumer demand. The heavy industry sector has

however been able to maintain demand as demand orders emanate from the light-industry sector. Labour shortage was a challenge for both upstream and downstream supply chain links. Findings on the short or long-term implications of the COVID-19 pandemic suggest that SMEs in residential services will experience the most impact on operating cost with a decline of 8 per cent.

Each ten-day period of lost work in the Chinese economy is estimated to reduce quarterly GDP growth by 0.39 to 0.46 percent (Luohan Academy, 2020). The longer the delay is in businesses returning to work, the greater the impact on investor and consumer confidence. This may lead to largescale SME closures, increasing unemployment and further reducing demand and investment. Delays in firms' recovery to full-capacity production will negatively impact upon exports and the global supply chain (Bouey, 2020).

Three months after the COVID-19 outbreak in China, many small businesses are not working at full capacity. Many employees continue to work from home, business owners attempt to fix broken supply chains and look for new domestic and overseas contracts (Bouey, 2020). Downstream firms that rely on the parts they produce for SMEs feel upstream SME closures. Many firms are unable to produce without some inputs and the logistics necessary to bring in and send out materials. Many international shipping companies are affected by the ongoing pandemic in other parts of the world because travel bans are in place. Many businesses are currently attempting to absorb the large losses they made during the first quarter of 2020, and, in ongoing uncertain times, are concerned about borrowing more when future revenues are uncertain.

5. COVID-19 AND CHINESE SUPPLY CHAINS

Prior to the COVID-19 outbreak, China produced 33 to 53 per cent of global electrical equipment and motor vehicle parts, 52 per cent of basic metals, 58 per cent of mineral products, 58 per cent of textiles, apparel, and leather, 40 per cent of wood and wood products, and 35 percent of pharmaceuticals. Many of these sectors incorporate intricate supply chains that in some cases include a multi-country dimension, in particular the electrical equipment, electronics, automotive, and textile sectors (McKinsey Global Institute, 2019b).

A supply-chain network is an important channel through which the COVID-19 pandemic may negatively impact both the domestic and global economy. Goods and services reach final destinations via complex supply chains. Disruptions at any point in the supply chain may prevent a good from being produced (Carvalho et al., 2020). The functioning of supply chains has been disrupted, generating spillover effects throughout different levels of supplier networks. For example, car manufacturers have ceased production due to a lack of parts, and Swiss watch manufacturers have faced disruption to their supply of components. As firms close in China and transportation links collapse, it is increasingly difficult for some firms to produce.

Supply chains become severely disrupted during a pandemic, and governments may need to direct support towards particular firms that are essential for meeting demand in a crisis. Carvalho et al. (2020) suggest that by monitoring business-to-business transaction data, essential firms in a supply chain can be identified. An essential firm is defined as one where demand for key goods at current prices cannot be met without that firm producing. Carvalho et al. (2020) suggest that these essential firms act as bottlenecks in supply chains. As part of their ongoing work, they provide an example where Ugandan business-to-business transaction data is used to identify two factories as being essential firms that could become bottlenecks in the supply chain if they cannot produce. They run an algorithm designed to identify bottleneck firms in a supply chain, and show how to design and deploy algorithms to pinpoint bottleneck firms in a system of firm-to-firm transactions. Their analysis identifies two essential firms that use 340 domestically-sourced suppliers and 96 foreign suppliers. The essential firms sell on to 135 distributors that in turn supply 1,548 retailers. All in all, over 2,000 firms depend on the chain. The two essential firms are bottleneck firms as they could potentially disrupt more than 2,000 firms if they could not produce. However, supply chains are often more

complicated than this as they often interact with each other, making it much more difficult to identify essential firms. Analysis shows that those Ugandan sectors with the greatest number of bottleneck firms include the agriculture, food and drinks sectors, the energy generation and distribution sectors, and some financial-service sectors.

6. SMES AND PANDEMIC PREPAREDNESS

Despite the literature examining the impact of pandemics on firms being extremely limited, there is a growing literature on the preparedness of SMEs for such crisis events. SMEs suffer most in times of crisis and are the least prepared of all organisations. In general, SMEs are particularly vulnerable to pandemics due to their limited capacities and resources to prepare for and cope with a pandemic. During a pandemic, an SME's infrastructure remains in place, but many employees are unwilling to travel or even enter the workplace. A continuity plan (including ways employees could work from home/remotely, for example) would therefore need to be put in place to keep the business going. For continuity plans to be successful, there would need to be effective collaboration among governments, international organisations, businesses, and other supply chain stakeholders.

In their study, Sullivan-Taylor and Branicki (2011) identify resourcefulness as a key barrier to SME resilience in the face of an extreme event. 'Resourcefulness' relates to the capacity of managers to identify potential problems, establish priorities and mobilise resources to avoid damage or disruption. The SME managers indicated that an awareness of their geographic and supply-chain context was critical, but they did not feel that they had the appropriate skill, knowledge or information to identify the challenges that they faced. They much preferred to 'muddle through' a crisis rather than take proactive actions.

Kato and Charoenrat (2018) examine business continuity management (BCM) practices in SMEs in Thailand. The impact of a pandemic on an SME depends on its BCM. BCM is comprised of preventative measures and preparedness arrangements (both of which need to be in place prior to the pandemic) and response options (which need to be in place when the pandemic occurs). The Disaster Recovery Institute (2015) defines BCM as "a management process that identifies risk, threats and vulnerabilities that could impact an entity's continued operations and [that] provides a framework for building organisational resilience and the capability for an effective response".

The study examines 136 SMEs in Thailand from the manufacturing, wholesale and retail, and management and supportive services sectors. Results from their qualitative study suggest that although there is substantial SME disaster experience, in general, SME preparedness for business continuity is limited or remains low. In addition, those SMEs with more disaster experience have a greater degree of readiness, including a written

BCP, business continuity knowledge and an understanding of training needs. SMEs operating on a large scale or for a longer period are more likely to be prepared for disasters and aware of business continuity and training needs. The study also highlighted that the main challenges for SMEs in implementing BCM were limited knowledge and understanding rather than financial constraints.

Having a strong business continuity plan may help minimise any negative impact on business during a pandemic. Business continuity and pandemic preparedness are vital in order to mitigate the effects of an approaching pandemic. A business continuity plan comprises many components that are designed to deal with a pandemic and address occupational health policies (these include paid sick leave for staff, enabling employees to work from home, offering a seasonal flu vaccine to employees, and having personal protective equipment (PPE) available to health care personnel). In one study, Rebmann et al. (2013) find that US businesses are not well prepared for a future disaster of any type, with the average business having fewer than half of the potential business continuity or pandemic planning components in their plan. In addition, smaller firms are the least prepared, increasing their risk of failure during a pandemic. Similarly, Smith et al. (2007) find that businesses are not prepared for a future pandemic – despite many firms beginning to plan, they never complete the process. The study finds that firms require assistance to prepare a plan as well as training to enable the plan to be implemented in the workplace.

Watkins et al. (2007) investigate the association between individual perceptions and preparedness for pandemic influenza among SME owners and managers in Australia. Using data obtained from 201 semi-structured, face-to-face interviews, they use binomial logistic regression analysis to identify the predictors of having considered the impact of, having a plan for, and needing help to prepare for pandemic influenza. Approximately 6 per cent of SMEs report that their business had a plan for pandemic influenza, 39 per cent report that they had not thought about a pandemic's impact on their business, and over 60 per cent said that they required help to prepare for a pandemic. Findings suggest that Australian SMEs are not prepared for a pandemic, and that beliefs about the risk, severity, and the ability to respond effectively to the threat of a pandemic are important predictors of preparedness. These findings are supported by Watkins et al (2008) who suggest that preparation and planning for a pandemic among SMEs is constrained by the perception that any risk from such an event is low, their inability to identify effective responses to a pandemic, and the limited resources available for preparedness planning

and response. Despite this, most SME owners and managers believed that a pandemic would have serious consequences if it were to occur, but that the likelihood of a pandemic occurring was low. Owners and managers believe that they can do little to prepare for a pandemic, and are unaware of resources that may be available to help them do so.

In summary, authorities could use targeted campaigns that utilise existing business networks to promote the relevance of the threat of pandemics to SME businesses. Existing networks could help SME owners and managers take effective steps to protect themselves from a pandemic. Business continuity is vital. By diversifying business platforms, for example online-based platforms and virtual service provisions, SMEs would be able to sustain their businesses during quarantine periods and travel bans. In addition, financial help, implemented through policy, as well as technical guidance would help SMEs restructure their business operations and continue to operate.

REFERENCES

- Almond, D. (2006). Is the 1918 influenza pandemic over? Long-term effect of in utero influenza exposure in the post-1940 U.S. population. *Journal of Political Economy*, 114, 4, 672-712.
- Auzzir, Z., Haigh, R. and Amaratunga, D. (2018). Impacts of disaster to SMEs in Malaysia. *Procedia Engineering*, 212, 1131-1138.
- Bouey, J. (2020). Assessment of COVID-19's impact on small and medium-sized enterprises. Implications from China. *Testimony presented before the House, Small Business Committee on March 10, 2020.*
<https://www.rand.org/pubs/testimonies/CT524.html>
- Brahmbhatt, M. (2005). Avian influenza: Economic and social impacts.'23 September. World Bank, Washington DC.
- Brainerd, E. and Siegler, M. (2003). The economic effect of the 1918 Influenza Epidemic. *Centre for Economic Policy Research*. Discussion Paper No: 3791
- Carvalho, V., Elliot, M. and Spray, J. (2020). Supply chain bottlenecks in a pandemic, *Faculty of Economics, Working Paper*, University of Cambridge.
<http://covid.econ.cam.ac.uk/carvalho-elliott-spray-supply-chain-bottlenecks-in-a-pandemic?fbclid=IwAR3ZiZw8R7eaICdHZf-sRQi7Qdm9HpWUjhAAVAvF3UVVL26hZRfunwNBO8>
- Centre for Systems Science and Engineering (CSSE) at Johns Hopkins University (JHU): Coronavirus COVID-19 Global Cases
<https://gisanddata.maps.arcgis.com/apps/opsdashboard/index.html#/bda7594740fd40299423467b48e9ecf6>
- Dai, R., Hu, J. and Zhang, X. (2020). The impact of coronavirus on China's SMEs: Findings from the Enterprise Survey for Innovation and Entrepreneurship in China
<https://www.cgdev.org/publication/impact-coronavirus-chinas-smes-findings-from-esiec>
- Disaster Recovery Institute. (2015). Professional Practices.
<https://drii.org/certification/professionalprac.php?Lang=EN>
- Fernandes, N. (2020). Economic effects of coronavirus outbreak (COVID-19) on the world economy. https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3557504

- Garrett, T. A. (2007). Economic effects of the 1918 influenza pandemic: Implications for a modern-day pandemic. *Federal Reserve Bank of St. Louis*.
https://www.stlouisfed.org/~media/files/pdfs/community-development/research-reports/pandemic_flu_report.pdf
- Garrett, T. A. (2008). Pandemic economics: The 1918 influenza and its modern-day implications. *Federal Reserve Bank of St. Louis Review*, 90.
- Garrett, T. A. (2009). War and pestilence as labor market shocks: US manufacturing wage growth 1914–1919. *Economic Inquiry*, 47, 711-725.
- Han, W., Harris, K. and Luedi, T. (2020). How much will Coronavirus hurt China's Economy? Bain & Company, February 8, 2020
<https://www.bain.com/insights/coronavirus-impact-china-gdp-snap-chart/>
- Jandoc, K., Mendoza, A. and Luz Quimboet, S. (2020). Vulnerable to the virus: Globally-oriented manufacturing firms at risk from the spread of COVID-19. *UP School of Economics Discussion Papers*. No. 2020-01, March 2020.
- Karlsson, M., Nilsson, T. and Pichler, S. (2014). The impact of the 1918 Spanish flu epidemic on economic performance in Sweden. An investigation into the consequences of an extraordinary mortality shock. *Journal of Health Economics*, 36, 1-19.
- Kato, M. and Charoenrat, T. (2018). Business continuity management of small and medium sized enterprises: Evidence from Thailand. *International Journal of Disaster Risk Reduction*, 27, 577-587.
- Keogh-Brown, M. R. and Smith, R. D. (2008). The economic impact of SARS: How does the reality match the predictions? *Health policy*, 88, 110-120.
- Long, H. W. and Feng, W. J. (2020). Research report on companies' survival and development strategy during a novel coronavirus epidemic, *Beijing: UIBE Press*, February 2020.
- Luohan Academy. (2020). Seven trends in China's macro-economy, February 13, 2020.
https://mp.weixin.qq.com/s/f_dwO4BMeyEZsv-xm8hXPg
- McKibbin, W. J. and Sidorenko, A. (2006). Global macroeconomic consequences of pandemic influenza: *Lowy Institute for International Policy Sydney, Australia*.
- McKinsey Global Institute. (2019a). China and the world: Inside the dynamics of a changing relationship, July 2019.
<https://www.mckinsey.com/~media/mckinsey/featured%20insights/china/china%20and%20the%20world%20inside%20the%20dynamics%20of%20a%20changing%20relationship/mgi-china-and-the-world-full-report-feb-2020-en.ashx>

- McKinsey Global Institute. (2019b). What Can We Expect in China in 2020?
<https://www.mckinsey.com/featured-insights/china/what-can-we-expect-in-china-in-2020>
- Meyer, A.D. (1982). Adapting to environmental jolts. *Administrative Science Quarterly*, 27, 515-537.
- Nesta (2017). The state of small business: Putting UK entrepreneurs on the map,
<https://www.nesta.org.uk/sites/default/files/the-state-of-small-business-uk.pdf>
- Potter, C. (2001). A history of influenza. *Journal of Applied Microbiology*, 91, 572-579.
- Rassy, D. and Smith, R. D. (2013). The economic impact of H1N1 on Mexico's tourist and pork sectors. *Health Economics*, 22, 824-834.
- Rebmann, T., Wang, J., Swick, Z. and Reddick, D. (2013). Business continuity and pandemic preparedness: US health care versus non-health care agencies. *American Journal of Infection Control*, 41, e27-e33.
- Smith, P. W., Hansen, K., Spanbauer, L. and Shell, D. F. (2007). Pandemic influenza preparedness: A survey of businesses. *Journal of Infection Control*. 35, 7, 484-485.
- Smith, R. D., Keogh-Brown, M. R. and Barnett, T. (2011). Estimating the economic impact of pandemic influenza: An application of the computable general equilibrium model to the UK. *Social Science & Medicine*, 73, 235-244.
- Sullivan-Taylor, B. and Branicki, L. (2011). Creating resilient SMEs: Why one size might not fit all, *International Journal of Production Research*, 49, 18, 5565-5579.
- Swift, K. T. (2009). Economic effects of a flu pandemic. *Chemical Engineering Progress*, 105, 9, p.22.
- The Star. (2020). Virus outbreak cost China 1 trillion Yuan loss in Chinese New Year week, February 3, 2020
<https://www.thestar.com.my/news/regional/2020/02/03/virus-outbreak-cost-china-1-trillion-yuan-loss-in-chinesenew-year-week>
- Verbano, C. and Venturini, K. (2013). Managing risks in SMEs: A literature review and research agenda. *Journal of Technology Management & Innovation*, 8, 3, 1-17.
- Watkins, R. E., Cooke, F. C., Donovan, R.J., MacIntyre, R., Itzwerth, R. and Plant, A. J. (2007). Influenza pandemic preparedness: motivation for protection among small and medium businesses in Australia. <http://www.biomedcentral.com/1471-2458/7/157>
- Watkins, R. E., Cooke, F. C., Donovan, R.J., MacIntyre, R., Itzwerth, R. and Plant, A. J. (2008). Tackle the problem when it gets here: Pandemic preparedness among small and medium businesses. *Qualitative Health Research*, 18, 7, 902-912.



Centre Manager
Enterprise Research Centre
Aston Business School
Birmingham B4 7ET
CentreManager@enterpiseresearch.ac.uk

Centre Manager
Enterprise Research Centre
Warwick Business School
Coventry, CV4 7AL
CentreManager@enterpiseresearch.ac.uk



www.enterpiseresearch.ac.uk