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**COULD THIS EVER HAPPEN IN SPAIN?
ECONOMIC AND POLICY ASPECTS OF
A SARS-LIKE EPISODE**

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Could this ever happen in Spain? Economic and policy aspects of a sars-like episode

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Introduction

Rare and extreme catastrophic events are by definition unlikely, but once they happen their consequences can be very costly on different accounts. Hence, prevention and preparedness are sound policies to limit both their occurrence and their consequences. Also, by definition, the shape of rare events is difficult to predict in advance and it is therefore problematic to devise the appropriate strategy to react to them. Several factors compound the likelihood and the impact of these events, such as, at one extreme, the globalization of exchanges of persons and goods involving the use of mega-carriers or, at the other, the availability of mass destruction technologies to terrorist groups. Before they occurred, extremely low probabilities were attached to events such as AIDS or S-11, but after they happen they are already embedded in the imagination of billions of people. For how long will humanity bear the heavy burden of AIDS? How to forget S-11? Every rare event entails a large number of lessons that policy-makers try to translate into new protocols and preventive measures. But no rare event resembles another and, given the recent crises, the perception that individuals and societies are relatively exposed to unexpected and unknown risks seems to be growing.

International public health was suddenly put to a hard test when the Chinese authorities informed the WHO on 11 February 2003 of an outbreak of (severe) acute respiratory syndrome (SARS) in the Guangdong province, with 305 cases and five deaths. The first known case had occurred on 16 November 2002 but the Chinese Ministry of Health failed to inform the WHO until three months later. Subsequently, further cases were identified and reported in Hong Kong, Hanoi, Singapore and Toronto. One month later, on 15 March 2003, the WHO declared SARS a 'worldwide health threat'. By the end of September 2003, when the WHO declared the outbreak contained, although its resurgence was still a 'distinct possibility' (1), a total of 8,098 cases and 774 deaths could be directly attributed to SARS, 99% of them restricted to a small group of APEC countries. The disease was transmitted by direct person-to-person contact via virus-laden droplets, rather than via airborne particles, and spread along international air routes. Relatives of patients, hospital personnel and other care givers, hotels, airports and airline personnel and customers, and attendants to international conferences were among the most exposed once the disease broke out. It took one month for the WHO's virtual laboratory networks, from 17 March to 16 April, to discover the causative agent, a new, previously unknown, form of *coronavirus*. But the only remedy against SARS continues to be prevention and quarantine, which has potentially important economic consequences. Rapid and firm action by global authorities (WHO), sometimes against the narrow-minded opinion of national and local authorities, proved to be a decisive factor in controlling the disease and curbing panic, economic damage and, above all, the death toll of one of the most potentially severe global health threats, after AIDS, in the last few decades (2).

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The lessons that can be drawn from the SARS episode are many and should not be neglected. They point critically to the establishment of an immediate response capacity at the global level based on intensive use of coordination, networking and commitment in the firm defence of the public interest. In facing a rare and sudden outbreak, the public authorities, whatever their level, should display the most absolute transparency, empowering their public health officials to cooperate and comply without interference with the procedures set up by the WHO which, in this case, have proved to be thoroughly successful. They should also make sure that the economic interests to be most affected by the measures to be put in place do not influence the entire process even if they have to be compensated in some way.

In the analysis that follows I deal mostly with some of the economic and policy aspects of a SARS-like event if it were to occur in a country such as Spain, which every year receives around 52 million foreign tourists, well above its total resident population, and where the tourist sector accounts for 12% of GDP, making many areas' economies critically dependant on tourism. Public health protocols, on the other hand, although improving, still suffer from official resistance to admit that a particular alarm should be activated publicly. More often than is desirable, the official reaction to first rumours in the media about particular hazards is 'this could never happen in Spain' only to be disavowed days later by a stubborn reality that puts everybody in place, unfortunately at a cost of precious reaction-time lost.

Are Rare Epidemic Outbreaks Really So Rare?

About fifty epidemic outbreaks take place every year world-wide (WHO, 2003a), most of them provoked by agents already known and locally contained, although with rather high fatality rates, particularly among deprived populations. SARS, however, was caused by a then unknown agent and the disease was disseminated in a worrying way to spots thousands of miles away from the originating area. Official opacity complicated matters considerably and the first reactions world-wide could not even avoid thinking of a terrorist attack. Nevertheless, the balance so far seems moderate compared with other well known epidemics.

It was the fact that the causative agent was not known that made SARS so frightening given the precedent set by AIDS a couple of decades before. Once the responsible agent was identified and effective anti-contagion measures adopted, SARS ceased to be a rare event. Future episodes caused by the same agent are not of course to be ruled out, but then the public health authorities will know what to do provided that the very first lessons have been well understood: transparency and prompt reaction.

'Rare' means (very) unlikely and thus one tends not to invest too much in prevention against something that has a (very) low likelihood of occurrence. It also means unknown and, again, one does not know how to protect against something that is unknown. The result is that rare events may cause much damage not only due to their intrinsic catastrophic effects but also due to either lack of preparedness or the inadequacy of preventive arrangements when their nature is of a new kind. This would clearly be a case of failure for which no 'market solution' would ever emerge due to high insurance premiums and adverse selection.

Little by little the idea of specific policy and insurance instruments to cope with the consequences of truly rare events of any sort is gaining ground among the policy-making community (3). This means that new protocols and an excess capacity of a new sort must be devised based on early warnings issued under global protocols, virtual networks, international reference knowledge, private-public partnerships and full accountability and transparency of the authorities. The insurance technique could also be invoked. According

to this technique policy resources should be committed up to the point where they equal the expected potential loss caused by any particular rare event. Events of extremely low probability, however, are difficult to be dealt with efficiently by standard insurance techniques. The fact that policy –or its absence– might affect the size of the shock or its occurrence, and the precise preferences of the policymaker –the loss function– can be compounded to give rise to a large variety of policy responses with the absolute neglect of certain risks being a possibility (4).

Even if the probability of occurrence is very low, the fact that damages may be huge makes the expected loss calculation –the simple product of both– a very relevant one. To be sure, this expected loss is extremely hard to measure in its two components. It is also difficult to identify on whose shoulders it would fall, and thus no efficient ‘market solution’ is likely to emerge spontaneously even if the insurance technique can be properly applied. Perhaps not even entire nations would be willing to divert scarce resources to prevent unknown trans-border health crises (5). There is thus a genuine case for a supranational authority to organize national and regional resources in a truly global scheme of the type mentioned above in order to build the new capacity needed to face the occurrence and the consequences of rare catastrophic events. Doing this, however, means no more than continuing the trend that organized societies have been following throughout history. Once more, what is new is the fact that global interactions of all sorts are exposing individuals and communities, increasingly linked by networks, to risks which have not been experienced so far as more conventional risks either disappear or become better contained (6).

Epidemic Outbreaks as Shocks to the Economy

Economic concerns soon became, after the death toll itself, some of the most feared consequences of SARS. The peculiar circuits described by contagions and the fact that tourist and business enclaves like Hong Kong and Toronto where targeted by the WHO as places subject to quarantines led their economic authorities to believe that a long period of stagnation was about to hit those areas. Airlines also feared that the SARS alarm would seriously damage their much awaited recovery after September 11. Not everywhere was the need to stop the epidemic fully understood by economic agents and some of the measures dictated by the public health authorities and the warnings issued by other governments to their nationals concerning travelling to certain tourist destinations where strongly opposed by representatives of economic interests affected by these measures.

Indeed, some epidemic outbreaks might also hit the economy severely. It all depends on the duration, intensity and spread of the disease. There are several categories of costs to the economy that need to be considered. First, affected workers are unable to fully contribute to production. Both these workers and non-active patients need to be medically treated at a cost, while the former have to be subsidised for forgone labour income. Of course, deaths among workers imply a permanent loss to output although, on the other hand, capital per worker rises, while deaths among non active people increase income per head. Then there is the fact that quarantines and fear of being infected pull people out of shopping malls and tourist destinations where human concentrations are frequent, thus provoking a reduction in the consumption of goods and transport services. However, caring services, mass vaccinations and the reinforcement of research capacity may be a bonus for workers and firms providing these services.

Although anecdotal microeconomic evidence in the aftermath of an epidemic outbreak might point towards countless distortions and losses, dynamic general effects may show up differently in the aggregate data. Growth analysts focus on GDP per capita as the indicator to be tracked before and after a given shock and this is particularly true when talking about demographic shocks –that is, shocks that exogenously affect the size and

composition of the population—. The sudden death of a child aged 10 will immediately increase output per head for ever but will most likely deprive the economy of its contribution to production as a worker or an entrepreneur and perhaps to future generations through its descendants. The sudden death of a retired worker or an inactive person would have the primary effect of increasing output per head. Thus the effects on output per head of an adverse shock to the population would depend on the shape of the age profile of the fatality rate. As for total output, or rather its rate of growth, an adverse shock to the working age population would almost surely have a negative impact even if mitigated by an increase in productivity.

Since modern economies rely to a considerable extent on the rapid transmission of information and consumers react swiftly to changing news about emerging risks that can eventually lead to deep crises of confidence, serious epidemic outbreaks that cannot be properly controlled can trigger an economic downturn, with plunging demand and output during one or more quarters until the situation has been mastered irrespective of the long-term consequences. To be sure, epidemics as serious as AIDS might also be devastating from an economic point of view in economies as backward as those of some Sub-Saharan African countries (Bell, Gersbach and Devarajan, 2003).

Western Europe lost almost one out of every three people to the devastating bubonic plague or 'Black Death' of the mid-14th century and although historians are yet to produce a proper economic evaluation of its consequences in terms of growth, it is widely believed that the disease caused such a shortage of workers and subsequent rise in wages that it prompted the end of feudalism.

The 1918 influenza epidemic was responsible for at least 40 million deaths world-wide, particularly among young adults, and in addition to causing enormous human suffering it significantly distorted the business life of many communities. In the US alone, where the first outbreak was recorded, about 550,000 excess deaths were caused by the disease. Despite the terrible toll, Brainerd and Siegler (2003) conclude in a recent study that every additional point in the mortality rate caused by the epidemics 'resulted in an average annual increase in the rate of growth of real per capita income over the next ten years of at least 0.15% per year'. As mentioned above, this is compatible with a diminished growth rate for total real output and a more than proportional fall in the rate of population growth due to the epidemics, on the one hand, and a more pronounced fall in the first years followed by a rapid catch-up in the following ones, on the other.

Most studies on the economic consequences of AIDS, however, clearly point towards a negative, and yet mild, economic impact of about 1 percentage point of GDP per head per year (7). This pandemic has been compounded in poor countries by inadequate policies, behaviours and resources of all sorts. It is still too early to fully evaluate the dynamic consequences of a disease that has spoilt the chances of a large number of babies (born and unborn) by also killing their parents. Simulations done for South Africa with the help of a dynamic generational model suggest that if nothing is done to stop the epidemics and keep children at school, the country would face economic collapse within a few generations (Bell, Gersbach and Devarajan, 2003).

SARS has also exacted a toll on the economies of East Asia. In its recent 2003 Economic Outlook the APEC (Asia-Pacific Economic Cooperation) quotes Asian Development Bank estimates of the economic cost of SARS of between 0.5 and 1 percentage points of GDP in the region, with Hong Kong, Singapore and Taiwan bearing the highest cost at 1.8, 1.1 and 0.9 pp, respectively, and China, Korea and Philippines the lowest cost, at 0.2, 0.2 and 0.3 pp, respectively (APEC, 2003). By May 2003 the WHO (2003) reported a total cost of US\$ 30 billion. These figures might seem a relatively moderate impact, although the air travel and hospitality sectors were severely hit during the high point of the outbreak –

March/April 2003—, with restaurant, hotel, airline and retailer turnover typically below half the corresponding figure on a year-to-year basis in major cities in the region. The rapid identification of the causative agent and the efficacy of the quarantines imposed were decisive in halting the spread of the disease and restoring consumer confidence. Most businesses were able to reverse the downward trend everywhere, so that the economic damage was limited to a relatively short period of time within the year and to minor parts of the economy as a whole.

Clearly, unless a sudden unknown disease gets out of control and even if the most directly concerned areas and businesses are seriously disrupted or go bankrupt, the economic consequences on a national basis of some of the major epidemics in recent decades seem moderate provided action is taken to contain the disease and other economic and financial measures come to the help of the most seriously affected areas, firms and workers. Policy in the public health and economic fields is of paramount importance in limiting the damage, as is the credibility of the authorities as regards transparency, commitment and degree of control over the situation.

Could it Ever Happen in Spain?

Some Facts and Figures about Health Hazards in Spain

Spaniards have memories of countless episodes in the more or less recent past when high public officials and members of the government, if asked by the media about rumours of a public health alarm, would invariably say on prime time TV that 'it could never happen in Spain', only to be disavowed hours or days later by the actual news. In the case of SARS, however, Spain's health administration simply and immediately said what was going on just when primary evidence about a first possible case was gathered by the health authorities. Spain has so far had one non-fatal case declared on March 26, 2003.

In November 2000, Bovine Spongiform Encephalopathy (BSE) or 'mad-cow' disease was categorically said not to affect Spanish farms by the Ministry of Agriculture even as cows were being sent to slaughter houses among serious doubts, later confirmed, that they had the disease (8). Suddenly, public attention was brought to bear on what had so far been common knowledge only among a group of informed insiders regarding bad practices in animal feeding. The animal variant of the disease has so far produced more than 350 certified cases in Spain, with increasing numbers every year although at a declining rate (9). None of these cases has been due to animals imported from other countries, but to improper feeding at home. No human victims have been reported so far. Tens of thousands of animals in contact with the affected ones have been slaughtered since then and generalized testing has been provided by the authorities. The cost to farmers, dealers and government agencies has not been evaluated but could be well above 300 million euros, with half that figure accounting for testing.

In spring 1981 a far reaching case of fraudulent adulterated oil broke out, killing more than 600 people and irreversibly affecting about 20,600 individuals in the following years (10). This 'toxic oil syndrome' case found the Spanish Public Health administration unprepared on almost every front to deal with the many dimensions of the disease, although with the help of simple public health measures the incidence of the disease was fully contained within a few months. The victims took the government to court and indemnities were established by the Supreme Court in 1997 at a huge economic cost that still in 2002 amounted to more than 300 million euros. Current regular payments to beneficiaries amount to around 20 million euros per year (11).

Finally, every year the media report an increasing number of more or less acute cases of Legionella that systematically leave a few fatalities behind before they can be stopped. Since 1997 weekly reports on the disease are compulsory. In 2002 a total of 1,461 cases

were declared, which means an incidence rate of 3.69 per 100,000 (12). The fatality rate for the period 1997-2002 can be estimated at 5.4% of those affected (13).

Normally, infectious diseases like SARS originate in tropical areas such as the rainforests of Brazil, Sub-Saharan Africa or South Asia, which have microbial ecologies that are not easily found in developed countries. So, in this respect, Spain is hardly the most likely place for an infectious outbreak like SARS to begin. Bio-terrorists, however, are certainly capable of releasing a violent viral agent anywhere, including Spain.

Even if the likelihood of an unknown violent infectious disease originating in Spain is negligible, the country has a very open medium-sized developed economy and an increasing immigrant population of more than 2 million, while it is also a prime holiday destination for more than 50 million tourists. Although trade, migrations and tourist flows mostly involved developed nations until a decade ago, developing countries are increasingly engaged in all manner of relationships with Spain, with Latin America, North Africa and Asia taking an increasing share. The country's geographical position also provides it with an increasing role in international connections between Africa and Latin America, on the one hand, and Europe on the other, with the added complication that some exchanges are of an illegal nature, involving drug and immigrant trafficking.

All these factors make Spain an indirect hub or hinterland where conventional and non-conventional health hazards can land, propagate and rebound to other countries. Nevertheless, in recent times the country has very rarely faced serious risks due to international exchanges. SARS itself has only claimed one non-fatal victim in Spain. BSE originated domestically rather than from imported cattle and the Toxic Oil Syndrome of 1981 was caused by imported oil that was illegally manipulated domestically. Legionella, associated with travelling, affects a few individuals every year, but 28% of all cases reported in the EU between 1987 and 1997 originated in Spain (14). Tropical diseases have so far had a negligible rate of incidence in Spain despite the increasing number of Spaniards travelling to countries where they are present and of nationals from these countries travelling to Spain. Cholera, for instance, has only been reported once in the past three years.

Imagine: Spain as a Hub or a Hinterland for a SARS-like Outbreak

As we have seen, Spain has a very small risk of experiencing a catastrophic outbreak associated with the kind of diseases we have mentioned. Nevertheless, it is interesting to speculate on what would be the likely economic consequences of a sudden and violent infectious disease associated with travel and having Spain as a major indirect hub or hinterland.

Being a 'hub' means being an international network node from which a disease can spread to many other countries by way of particularly intense exchanges of travellers or goods. The circuits most frequented by foreign travellers would be hit, similarly to Hong Kong, Singapore and Taiwan when SARS first started to spread out from China.

Being a 'hinterland' means that local populations are the most affected after the disease carriers that have entered a country end their journey in certain relatively closed localities without engaging in subsequent international or long-distance connections. Thus the disease is spread in the immediate social and geographical circle.

In 2002 more than 141 million traveller displacements were registered in Spanish airports, of which 84.6 million or 60% had an international origin/destination. The country is home to an estimated 2 million immigrants that tend to be concentrated in large cities, coastal areas and agricultural areas where unskilled job opportunities abound (15). Spain trades goods and services with the rest of the world at a rate that amounts to more than 60% of

its GDP or around 400 billion euros per year. Although until recently most persons and goods went to and from developed nations, exchanges with developing countries in Asia, Africa and Latin America have steadily increased in both absolute and relative terms.

SARS did not affect Spain, except for a non-fatal case whose likelihood was announced well in advance by the health authorities in an unusual exercise of openness given the misperception that early warnings cause social alarm. This is encouraging as far as policy is concerned. SARS itself is precisely the paradigm of how official obscurantism and incompetence can complicate matters on a global scale. Other diseases associated with international exchanges have had an equally limited impact on Spain. Let us speculate, however, on the economic consequences of a hypothetical severe epidemic outbreak that could hit the country from abroad, subsequently spreading to other areas in the country and to other countries through domestic and international connections.

Policy Arrangements

Since the mid 1990s Spain has been creating instruments and institutions to gather information on rare and infectious diseases, launch alarms and warnings and take pre-emptive and curative action in case of need. Some of these instruments are part of wider European or multinational networks (eg, the WHO) and are the result of lessons learned out of past mistakes and/or international experience.

As recently as November 2003 an Order of the Spanish Health Department created the Instituto de *Investigación de Enfermedades Raras* –the Research Institute for Rare Diseases– heir to the earlier *Centro de Investigación sobre el Síndrome Tóxico y Enfermedades Raras* created in December 2001, twenty years after the Toxic Oil Syndrome broke out. A Royal Decree issued in 1995 created the Spanish Epidemiologic Surveillance Network, with a clear distribution of tasks among regional and national authorities and detailed protocols for the major diseases whose declaration by practitioners is compulsory. Among these diseases, Legionella is closely tracked both at home and internationally, having entered the compulsory disease register in 1997. This network in particular would be in charge of activating any alarm related to a health hazard of epidemic nature. Its work would also be supported by the border control posts for foodstuffs and the associated warning networks that are EU-wide or WHO-coordinated (16).

In principle, therefore, the Spanish scheme to prevent infectious diseases seems to be well based on up to date arrangements and internationally connected protocols that follow closely EU and WHO directives and rules. But policy instruments need to be promptly and efficiently used when needed and, as mentioned above, only recently have Spanish health officials seem to have broken a long record of systematically downgrading, when not neglecting, health hazards inspired by the very debatable prejudice that public opinion should not be allowed to know until it becomes unavoidable. It happens some times that the delay needed to obtain strong evidence is relatively long while prevention needs to be established much earlier if significant damage is to be avoided. No recommendation could then be stronger than that of properly informing the general public as soon as possible as the first step in the preventive chain that has to be established in order to radically curb the spread of an epidemic outbreak.

To be sure, interested parties that might be economically hurt by early warnings or measures will criticize and oppose them, claiming that evidence is insufficient and that over-reaction is dangerous. But these concerns, unless fully justified, should not prevent policy from being implemented. Extreme rare events are unlikely but may be very damaging. When they break out, petty economic interest will need to be sacrificed to avoid greater costs. The former can always be compensated at a much lower cost. Policymakers thus need to be isolated, possibly by formal law, from this kind of

interference but they also need to be advised, also possibly by formal law, by the best independent scientific opinion available.

Economic Evaluation

Were a violent epidemic outbreak to occur in Spain, a first consideration (to be taken into account also for its economic consequences) would be: whether action would be readily undertaken or not with the needed intensity. This has turned out to be the first lesson from the SARS outbreak. Delayed or limited action increases the range of spread of the disease both at home and abroad, leading to wider consequences of all sorts. Even if the outbreak did not originate in a country that at some stage could become an indirect hub for its further spread, the extent to which the health authorities in this particular country neglect their duties would determine the disease's global spread pattern. Take the SARS case once the WHO took control in mid-February 2003. WHO declared the disease a global threat one month later, the time it took to discover the causative agent, and the health authorities started to act decisively to halt the disease. Quarantines were imposed everywhere and the spread started to be halted at the end of April in Vietnam. The delay with which the Chinese authorities reacted helped to disproportionately spread the disease. Scientific evidence soon showed that the infection had a mean reproduction number of 3 persons infected by each patient and a mean serial interval or incubation period of 10 days. A disease is said to be controlled when the reproduction number falls below 1, thus killing its geometric expansion; this happened everywhere immediately after quarantines were established (17). These parameters characterize a relatively easily controllable epidemic once proper action has been taken. This did not happen until after about three months of the occurrence of the first case. The delay was then critical in setting off the spiralling spread of the epidemics and the consequences that followed (18).

Prompt and Effective Action

Just a few controlled cases will prevent major negative consequences, but proper control means imposing quarantines on persons and establishments and also entails that unaffected people avoid contact at risky places such as airports, restaurants, shopping malls and entertainment areas. The medical treatment of a few dozens properly quarantined cases would have very limited direct economic consequences and only disturb normal working in a handful of hospitals and care units. Consumption and travel restraint in risky places would inflict more serious costs, although they would also be limited as people's perceptions would sooner rather than later reflect the conviction that the situation is under control. Clearly, a SARS-like outbreak would require a considerable international effort to identify the causative agent and possibly the treatment. A medium-sized country like Spain would not be able to make the effort alone. But another lesson learned from SARS is that simple measures like quarantines and personal hygiene can place a strong check on any epidemic if firmly adopted to the necessary extent.

The above scenario would doubtless create uncertainties but not necessarily panic, at least a lasting one. Under this scenario, travel to Spain and expenditure at affected locations would perhaps suffer intensively, but only for a few weeks. As mentioned above, the total direct economic cost to patients and the distortions to the health system would be low. As for the costs for the businesses concerned, this would depend on their location and the time of year at which the outbreak occurs.

At the height of the tourist season, an international warning not to travel to some areas in Spain would significantly reduce the number of foreign tourists and their expenditure. Of Spain's more than 52 million visitors per year, around 7 million arrive in months like July and August and less than the 3 million in January. If the crisis were to reduce international travel to half these numbers, which is a severe shock even if only temporary, the effect would be to reduce the sector's annual turnover associated with international travel by

between 7% (August) and 3% (January). A similar pattern would be experienced by hotels, restaurants and other businesses located in tourist areas. Final consumption by non-residents in Spain amounted to more than 5% of GDP in 2002, or 35 billion euros, and it is with this that the likely impact should be compared. To these figures should be added the effects of reduced domestic travel and expenditure in the areas concerned, although they would probably be compensated by increased travel to and activity at alternative places elsewhere in the country. Furthermore, part of the costs suffered by the affected businesses would be recovered later, once the alarm is over, as some consumers would have merely delayed their plans to travel. Links to other non-tourist sectors of the economy (agriculture and manufacturing) would not be significant on an annual basis.

All in all, under the prompt action scenario, the Spanish economy could suffer a limited economic impact that could lie in an upper range of between 1,050 and 2,450 million euros depending on whether the outbreak occurs in, respectively, the low or the high season. These limits imply a range of between 0.15% and 0.35% of GDP. This is a limited impact indeed, even if some individual businesses suffer considerably or go bankrupt, and is in line with the estimated economic effects of SARS in the less affected APEC economies (APEC, 2003).

Of course, an epidemic with a higher reproduction number and/or a lower serial interval would lengthen the period of prevalence of the disease even if prompt action is taken. Hence, the reaction of consumers would be greater and so would the economic losses of the sectors affected.

Delayed or Insufficient Action

Delayed or insufficient action could take several forms. If the health authorities were to conceal from the public that a rare SARS-like epidemic outbreak was underway, open measures would not be taken to lower the reproduction number and therefore the number of cases could increase according to the pattern discussed in note 18 above. Rumours and news would in any case circulate and panic among travellers and consumers would grow until proper action was taken. After this, damages would be limited but to the costs estimated above should be added some unspecified extra costs, probably of the same or a higher magnitude. The human toll, however, and the distortion to the health system would have meanwhile been considerably higher than in the prompt and efficient action scenario described above. Legal procedures against the health authorities would also most likely be initiated, ending in high indemnities to be paid to the victims.

On the other hand, if action were to be taken at the outset but were to fail to reduce the reproduction number below 1, prolonging the prevalence period of the disease, the economic consequences could be far more serious and amount to several percentage points of GDP in a given year. Remember that SARS has been estimated to cost up to 2 pp of GDP to the most affected APEC economies or US\$30 billion in all (APEC, 2003). The SARS episode so far can be characterized as a case of delayed action, due to obscurantism and the incompetence of the Chinese authorities in the first three months and by prompt and efficient action, notably by the WHO, in the following month. No instance of an open-ended case of an epidemic outbreak in which consumers panic and which goes unchecked for a long period of time has been recorded in recent decades, the nearest cases being the 1918 influenza epidemics and AIDS.

Concluding Comments

This paper has attempted in a relatively crude way to estimate the economic consequences of a SARS-like epidemic outbreak in Spain, in which it is a secondary hub of the disease. Per se, Spain could hardly be the origin of such an outbreak given her

geographical situation (and economic status) but the country is increasingly taking part in the global exchange of persons and goods and in particular with countries where an epidemic could originate. It is also home to a rising immigrant population.

Several lessons can be derived from SARS, of which the most important is that prompt and effective action, even at the expense of costly and unpopular isolation measures, is the best way to limit the overall incidence irrespective of treatments being readily available or not. The health authorities must be convinced by any means not to adopt obscurantist measures or delaying tactics for that would exponentially increase the damage to both the population and the economy.

Not all epidemic diseases, even violent ones, have the same economic effects as the 1918 influenza case, but consumer panic associated with isolation measures no matter how promptly taken would clearly have negative economic effects. Based on available estimates on the economic consequences of SARS so far, and taking into account the economic size and share of the Spanish tourist sector, I estimate an upper range of between 1 and 2,4 thousand million euros in the 'prompt and effective action' scenario, depending on the season of occurrence of the outbreak if it were to happen in Spain.

Similar raw computations could be made concerning different 'rare' and extreme events occurring in Spain or elsewhere. There is a growing public perception that new types of risks, from epidemics to mass terrorism or a combination of both, can happen more often than ever before. Clearly, new policies and new insurance instruments are needed to counter that perception if not the occurrence of these events. To be sure, natural disasters, terrorism and wars, which are unfortunately not rare events at all, cause considerable more human suffering and economic loss than the type of events I have dealt with in this paper.

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Notes:

(1) As of 8 January 2004, the Chinese authorities had informed of two new SARS cases in Guangdong province. Three other suspected cases are also undergoing tests in a Hong Kong hospital.

(2) See WHO (2003a) for a summary description of the episode and an evaluation.

(3) This is the case indeed since the early nineties when unprecedented extreme cases of natural disasters and terrorist attacks revealed the inefficiency of current insurance arrangements. After September 11, the need for proper coverage to protect victims against extreme damages has become more acute (Kunreuther et al, 2003).

(4) See Svensson (2003) for an analysis of monetary policymaking in the face of extreme low-probability shocks to inflation.

(5) SARS is an eloquent example of trans-border spread. The West Nile fever that reached the US a few years ago is believed to have been vectored through mosquitoes in imported tyres. The Spring 1918 influenza wave was first recorded in March among army recruits at Camp Funston, Kansas. It reached Europe weeks after via American troop ships and by June 1918 it had reached India, Australia and New Zealand (Patterson and Pyle, 1991).

(6) See Kunreuther et al (2003) for a review of these new challenges, particularly in the case of terrorism.

- (7) The Economist, 12/IV/2003, p. 75.
- (8) *El País*, 8/XI/2000 and 24/XI/2000.
- (9) As of 19/XI/03, see <http://www.eeb.es/pags/espana.htm#2000>.
- (10) Fatalities are those exclusively due to the epidemics. See Posada de la Paz (2002) for a comprehensive epidemiologic analysis of the syndrome.
- (11) See <http://imsersomayores.csic.es/documentos/documentos/inss-informe2002-01.pdf>, pp 77-83.
- (12) See <http://cne.isciii.es/ve/EDO2002.htm>.
- (13) See <http://cne.isciii.es/ve/legionelaweb.PDF>, Table 1.
- (14) This risk is monitored in Spain through an EU Network, the 'European Working Group for Legionella Infections' (see www.ewgli.org). Concerning the 28% figure mentioned in the text see www.msc.es/medioambient/agenbiologicos/legionelosis/pdf/vigilancia_legionella.pdf.
- (15) Official figures for immigrants in Spain are, however, much lower, the difference being attributable to irregular immigration. The *Encuesta de Migraciones* of the Spanish Statistical Office (<http://www.ine.es/inebase>) gives a figure of 984,100 at the end of 2002, of which about half were working. More than half a million came from Latin America (368,900), Morocco (110,600) and the rest of Africa (41,200). Less than 20,000 came from Asia.
- (16) Up to ten EU-wide networks are at present tracking different diseases in Spain as well as the WHO Computerized Information System for Infectious Diseases (CISID). See RNVE (2003).
- (17) See WHO (2003b).
- (18) A reproduction number of 3 and a serial interval of 10 imply that the number of infected patients grows to in days. Take , or three months (90 days), and the number of theoretical cases will be 19,683. When x is taken to be 6, or two months, the number of cases is 729. The number of cases drops to only 27 if x takes the value of 3, or a one month delay.

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