MEMORANDUM TO PRESIDENT

THROUGH NSA, COS, COVID-19 TASK FORCE

RE: REQUEST FOR SUPPLEMENTAL APPROPRIATION

There is an increasing probability of a full-blown COVID-19 pandemic that could infect as many as 100 million Americans, with a loss of life of as many as 1-2 million souls.

1.29.20

MEMORANDUM TO NSC
FROM PETER NAVARRO
RE: IMPOSE TRAVEL BAN ON CHINA?

If the probability of a pandemic is greater than roughly 1%, a game-theoretic analysis of the coronavirus indicates the clear dominant strategy is an immediate travel ban on China.

We confront two stylized choices: Aggressive Containment versus No Containment. We face two stylized outcomes: A relatively modest "seasonal flu-like" outcome with relatively low rates of transmission and mortality versus a more deadly "pandemic flu" such as witnessed with the Asian, Hong Kong, Spanish, and Swine Flus.

Costs estimates range from zero in the Seasonal Flu/No Containment outcome to $3.8 *trillion* in the Pandemic/No Containment outcome. These cost estimates account for both the loss of economic activity and human life and are derived from a recent CEA study.

	"Seasonal Flu"	Pandemic
Aggressive Containment	-$2.9 Billion	-$34.6 Billion
No Containment	0	-$3.8 Trillion

From this cost matrix, one can compute the "expected value" of each possible outcome from assumed probabilities. As soon as the probability of the Pandemic outcome rises above roughly 1%, the dominant strategy is aggressive containment. This is because of costs of a No Containment/Pandemic scenario are so staggering, including the possible loss of as many as half a million American lives.

It is unlikely the introduction of the coronavirus into the U.S. population in significant numbers will mimic a "seasonal flu" event with relatively low contagion and mortality rates. The coronavirus is not the result of a small "antigenic drift" from a virus our population has built up immunities to, as with seasonal flu. Rather, we effectively have an extreme "antigenic shift" to a virus where our population has little or no immune protection.

Note that it was an antigenic shift that led to the four influenza pandemics we have witnessed since 1918 – "Spanish," Asian Hong Kong, and Swine Flu.

Note, too, that the risk of a pandemic rises exponentially with the "R naught" of any given disease, which measures how many new people may be infected with each new infection of one person. Seasonal flu has an R naught of only 1.0 In contrast, China is reporting a possible coronavirus R naught of from 3 to 5, which is greater than Swine Flu (1.5), Spanish Flu (2.2), and SARS (2.8) and in the range of Bubonic Plague (3.5), Polio (3.5), Scarlet Fever (4.0), and Smallpox (5.0).

Please see attached memo for a more detailed analysis.

Should the White House Order a Travel Ban to Combat a Potential Coronavirus Pandemic?

White House Office of Trade and Manufacturing Policy

1.29.20

Introduction

In light of the rapid spread of the Chinese coronavirus, game theory is instructive in assessing the need for swift containment and mitigation measures.

In a game-theoretic framework, we confront two stylized choices: Aggressive Containment versus No Containment. We also face two stylized outcomes: A relatively modest "seasonal flu-like" outcome with relatively low rates of transmission and mortality versus a more deadly "pandemic flu" such as witnessed with the Asian, Hong Kong, Spanish, and Swine Flus. Costs estimates range from zero in the Seasonal Flu/No Containment outcome to $3.8 *trillion* in the Pandemic/No Containment outcome. These cost estimates account for both the loss of economic activity and human life and are derived from a recent CEA study.

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The Cost Estimates Derived

Regardless of whether the coronavirus proves to be a pandemic-level outbreak, there are certain costs associated with engaging in policies to contain and mitigate the spread of the disease. The most readily available option to contain the spread of the outbreak is to issue a travel ban to and from the source of the outbreak, namely, mainland China.

Aggressive Containment/Seasonal Flu Scenario

According to CEA estimates, the cost of stopping travel from China to the United States is approximately $2.9 billion per month (or 0.013% of GDP). While we would not expect a travel ban to remain in place for an extended duration of time if the coronavirus proves to be a mild outbreak, history suggests that the travel ban would need to remain in place for approximately one year if the outbreak proves to be a pandemic.

Based on CEA's assessment and these historical precedents, we assess that if the coronavirus is a mild outbreak mimicking "Seasonal Flu," a preemptive travel ban would need to be imposed for approximately one month before the Chinese government is able to gain control of the outbreak. The loss associated with this "ounce of prevention" is calculated by CEA to be approximately $700 million per week or $2.9 billion total in lost economic activity.

Aggressive Containment/Pandemic Scenario

If the coronavirus triggers a pandemic, the travel ban would likely be extended for at least twelve months. In this "Pandemic" scenario, the U.S. would lose approximately $34.6 billion in economic activity (with no accounting for the costs of possible loss of life should containment be less than 100%).

No Containment/Seasonal Flu Scenario

If the coronavirus fears prove to be unwarranted, and the United States elects not to take any action to contain and mitigate the spread of the disease, it will have incurred zero economic costs associated with a travel ban and no loss of life over and above what might be expected in a Seasonal Flu scenario.

No Containment/Pandemic Scenario

If the outbreak proves to a true pandemic without the "ounce of prevention," the "pound of cure" will be extraordinarily expensive. Two alternative scenarios provide useful estimates of the potential costs of failing to aggressively contain. The first, based on a September 2019 study by CEA, finds that a pandemic outbreak of the common flu would have economic costs of approximately $3.8 *trillioni*, as noted in the matrix above. This high cost is largely driven by the value of lives lost, as estimated by Aldi and Viscusi (2008). In this case, the study assumes 30% of the population would be infected, with 0.44% of those infected dying as a result – on the order of a half a million American souls.

A second scenario assumes a more conservative 5.5% of the population is infected by the coronavirus. This matches the infection rate of the Hong Kong flu of 1968. However, this scenario also assumes a higher mortality rate of 3%, based on the official statistic from China. Given current U.S. population estimates, this implies 18 million American citizens infected with coronavirus, with 543,000 deaths. Given CEA's estimated value of a statistical life, this would create an estimated net economic loss of $5.7 trillion from lost lives, in addition to any medical costs and lost wages.

Other Factors to Consider

The risk of a worst-case pandemic scenario should not be overlooked in light of the information provided by the Chinese government that is specific to the coronavirus.

Seasonal flus, such as the one this assessment is modeled after, reflect a small "antigenic drift" from previous variations of a disease. In sharp contrast, the coronavirus reflects an extreme "antigenic shift" – a situation where Americans have yet to develop immunities to this disease.

The lack of immune protection or an existing cure or vaccine would leave Americans defenseless in the case of a full-blown coronavirus outbreak on U.S. soil. This lack of protection elevates the risk of the coronavirus evolving into a full-blown pandemic, imperiling the lives of millions of Americans.

Epidemiological history supports the view that antigenic shifts present a far greater threat. It was an antigenic shift that led to each of the influenza panics we have seen in the past century – the "Spanish", Asian, Hong Kong, and Swine Flus. Note also that there have been exactly four pandemic flus over the past 102 years suggesting that, the likelihood of a pandemic flu outbreak is in the range of 4 percent.

This historical precedent alone should be sufficient to prove the need to take aggressive action to contain the outbreak. However, current estimates suggest that risk may be even higher. The risk of a severe pandemic rises exponentially with the R_0 value of any disease, which measures how many new people each infected person spreads the disease to, on average. China is reporting a possible coronavirus R_0 of 3 to 5 – which is roughly twice as high as the Swine Flu (1.5) and Spanish Flu (2.2), and in the range of the Bubonic Plague (3.5) and Polio (3.5).

2.23.20

MEMORANDUM TO PRESIDENT

THROUGH NSA, COS, COVID-19 TASK FORCE

RE: REQUEST FOR SUPPLEMENTAL APPROPRIATION

There is an increasing probability of a full-blown COVID-19 pandemic that could infect as many as 100 million Americans, with a loss of life of as many as 1-2 million souls.

To minimize economic and social disruption and loss of life, there is an urgent need for an immediate supplemental appropriation of at least $3.0 billion dollars to support efforts at prevention, treatment, inoculation, and diagnostics.

This is NOT a time for penny-pinching or horse trading on the Hill. Uncertainties associated with developing a vaccine and viable treatment options should NOT slow down investments in these high risk, high reward ventures.

In this Administration, we take appropriate risks to protect the public. We move in Trump Time to solve problems. We always skate to where the puck might be – in this case a full-blown pandemic.

We CAN develop a vaccine and treatment therapeutics in half the usual time. We MUST get appropriate protective gear and point of care diagnostics.

Any member of the Task Force who wants to be cautious about appropriating funds for a crisis that could inflict trillions of dollars in economic damage and take millions of lives has come to the wrong administration. Here's what we need when our representatives from HHS and OMB go to the Hill this week to ask for funds – and it's a conservative estimate.

Table 1. Supplemental Appropriation Needed

	Millions	
Personal Protective Equipment	$618	Facemasks, Gloves, Goggles, Tyvek Suits, Ventilator Circuits, Positive Air Pressure Respirators
Treatment Therapeutics	$528	Intravenous (Remdesivir), Oral, Monoclonal Antibodies
Vaccine Development	$1,600	A 4-5 Company "Horse Race"
Diagnostics	$280	Point of Care and Large Lab
TOTAL	$3.0 Billion	

Personal Protective Equipment

This is the first line of defense for our health care workers and secondary workers in facilities such as elder care and skilled nursing. Key items include N-95 facemasks, goggles, gloves, Tyvek suits, ventilator circuits and Positive Air Pressure Respirators (PAPRs).

Over a four to six month period, we can expect to need at least a billion face masks at 54 to 61 cents per mask or an assumed point price estimate of 57 cents and a total of $570 million. These masks will be roughly spread across health care workers, workers for facilities such as elder care and skilled nursing, and the general population.

In addition, we will conservatively need 200,000 Tyvek suits, which are used in ICU-type conditions at a cost of $10 per suit or $2 million, and 3.3 billion gloves in packages of 100 at $10 per package for a cost of $3.3 million.

Ventilator circuits connect ventilators to patients. At a price of $1,500 per unit and an expected demand of 11,000, that's another $16.5 million. An additional 25,000 PAPRs are expected to be needed at a cost of $26.4 million.

Total categorical cost: $618 million

Treatment Therapeutics

Patients with severe to moderate symptoms may potentially be treated with three different kinds of therapeutics: the intravenous delivery of Remdesivir, an oral treatment, or a serum of monoclonal antibodies.

Remdesivir was originally developed by Gilead to treat Ebola but has shown potential with COVID-19. Clinical trials are being conducted in China, Japan, and Nebraska; and we should have a good idea within 30-60 days of its efficacy. HHS has already procured 4,500 doses at a cost of $2,200 per dose. It is imperative we secure 90,000 additional doses available as bulk product at a cost of $198 million.

Even if Remdesivir is efficacious, it is important to develop an oral antiviral which can be administered outside a hospital setting. Such an oral antiviral can be developed quickly by screening several thousand drugs that have already been approved for other purposes and therefore shown to be safe.

Steps to develop an oral antiviral include screening and lead identification, lead development, pre-clinical development, and Phase One and Phase Two screenings. This can be fast-tracked, with possible options available by end of summer. If two leads turn out to be efficacious, the estimated cost is $84.5 million per lead or $169 million.

Monoclonal antibodies are used to strengthen a patient's immune system. The cost to take two monoclonal antibodies through Phase I clinical trials is based on actual option costs in the Other Transactional Authority with Regeneron for a total of $161 million.

Total costs, then of the three types of treatment therapeutics equals $528 million.

Vaccine Development

Vaccine development is a high risk, high reward venture. To maximize the probability of success we must take "multiple shots on goal." We CAN move a vaccine through in half the normal time in this administration.

Table 2 summarizes the costs of engaging up to five candidates. Total cost is estimated at $1.6 billion with most of these expenditures in FY20.

Table 2. Vaccine Development

Description	Millions	Notes
Vaccine Development	$1,000	Start up to 5 candidates, leverage and share knowledge/resources among all, assume one or more would be supported through Phase III
Large-scale Domestic Manufacturing Capability	$600	Assuming manufacturers will use existing domestic manufacturing capacity for their product; some will require expansion/tech transfer into domestic CMO facilities/CIADMs
Total	**$1.6 Billion**	No-year funds appropriated to leverage flexible management of portfolio

Diagnostics

Categories include: lateral flow antigen detection tests (numerous assays and platforms of this type exist); small, simple to use, portable molecular devices for which some already exist and are FDA-cleared; and novel platforms and technologies as of yet unproven for as a clinical diagnostic platform for an infectious disease.

Potential candidates for Small Handheld POC Molecular Systems are available on the market with FDA clearances for other diseases and will accept swab collected samples. They can be held in a user's hand, but are typically used on a tabletop, and require very little sample processing outside the device. They are appropriate for limited resource setting use.

Table 3 provides an overview of the costs and expected timelines, with a total categorical sum of $280 million.

Table 3. Diagnostics Costs and Timelines

Type	Time to EUA (Months)	Total Cost ($M)
Hand Held POC w/ Clearance	4-6	30
Handheld POC no Clearance yet	12-18	60
Larger Benchtop POC	4-6	45
Large Lab Instrument	3-5	45
Innovative Diagnostic Challenge	3-16	$100
Total		$280

Bottom Line

There is a compelling argument for a $3.0 billion supplemental appropriation. A large portion of the funds are for vaccine development. It is critical that vaccine development be supported – the apparent risk averse culture among some members of the Task Force have caused us to already lose precious days.

In the current fog of uncertainty, vaccine development remains market-driven based on the private sector's assessment of the direct costs of development, the odds the vaccine may be needed, and the opportunity costs of shifting R&D and production facilities to an activity which may not be profitable. This is a recipe for losing days, weeks, and perhaps months if WE don't step in and catalyze the process.

Time is of the essence for all four points of the PPE, treatment, vaccine, and diagnostics!