

The Underlying Factors of Argentina's Inability to Escape the Middle Income Trap

Yi Lai^{1,a,*}

¹*St. George's School, 4175 West 29th Ave, Vancouver Canada, V6S 1V1
a. Jason.lai24@stgeorges.bc.ca
corresponding author

Abstract: When the issue of climate change is brought to the general public, it is often a global disaster. Ironically, many people are deliberately unaware of the global climate disaster due to its wide breadth. To better frame the threats of climate change, there needs to be more focus on national or local economies. This paper uses the framework of the middle-income trap to examine the effects of climate change on Argentina's agriculture industry and national infrastructure. Through analysis, it is found that the fluctuation of Argentina's high-income and middle-income status closely correlates with climate change.

Keyword: Argentina, Middle income trap, climate change, economy, agriculture

1. Introduction

Of the threats that cast a shadow over the world, climate change is arguably the greatest. Despite the hazards it presents to humanity, climate change is seen as a political myth - a problem for future generations to solve. One of the problems with climate change is its image that manifests in people. After all, making the world a little warmer would certainly make more people happy; however, what is often forgotten is the economic cost of global warming, and how it essentially stymies economic progress. South America, with a number of nations stuck in the middle-income trap, continues to linger there not only because of politics, geography, and education systems, but also because of climate change. The latter of which has become an increasing factor for Argentina, a country that has regressed into middle-income status that is exacerbated by climate change, leaving it straddling the line between middle-income and high income status. This paper will be analyzing the impacts of climate change on Argentina and how it hinders the nation in fully escaping the middle-income trap.

2. Background of Argentina: The Middle-Income Trap

The World Bank defines the middle-income trap as a situation where per capita income fluctuates between \$10,000 and \$12,000 USD [1]. Countries that persist in middle-income status have a chance of economic stagnation or even potentially sliding back into low income. The middle-income term itself has come under some scrutiny, especially with China's economic success despite being a middle-income country [2]. However, it could also be seen as an outlier instead of being heralded as a redefinition of a middle-income country. Moreover, there have been arguments by some economists; in fact, some economists have proposed to change the definition of a middle-

income country, raising the upper threshold of per capita income to \$15,000 [3]. Regardless of the definitions, Argentina has been one of two countries to escape the middle-income trap in the 21st century, and the only one that has not slid back into the trap, as Greece did during its debt crisis [1]. Falling back into or staying in middle-income status could result in two possibilities: an economy that reaches a high level of income and continues to thrive with growth sustained at a lower rate, or one of permanent stagnation or slow decline into poverty.

Argentina's economic vulnerabilities lie in its dependency on industries and infrastructure that are particularly vulnerable to climate change. The agriculture industry in the fertile Pampas region makes up more than 20% of its gross domestic product (GDP) [4]. Neighboring cities like Santa Fe are in turn reliant on these agricultural resources to refine and produce products for export. This large intertwined system has come under threat due to climate change, with the environmental duress lowering its yields as high as 30%, and the unpredictability has put a strain on growing the Argentinian economy [4]. Climatic shifts come coupled with extreme heat and unmanageable precipitation that is constantly damaging infrastructure and slowing production - all of it putting the Argentinian economy at risk.

3. Climate Change Challenges

3.1. Changes in Precipitation & Flooding

Flat land, suited for agriculture, is rare in a mountainous and coastal nation like Argentina. The Pampas region, famed for its agricultural output, has faced inconsistent production since the 80's, due to weather instability caused by climate change. Commercial agriculture is precise, with yields projected by the pound year by year in order to maximize harvests and export potential. Inconsistent volume results in GDP in a country that relies on the field for one-fifth of its economic growth [5]. Flat land has made the area vulnerable to changes in hydrology in the area. The Pampas are surrounded by the Paraguay, Parana, and Uruguay rivers. The benefit to agriculture is obvious, but it also leaves the Pampas particularly vulnerable to environmental change [4].

Climate change has been blamed for changes in precipitation in the area. Since the 1960's, the median rainfall has increased by nearly threefold, going from around 50 mm per annum to 150 mm [4]. This would not be an issue if the change was consistent, and crops could be changed to meet the changing environment, but the greatest issue that comes with extreme precipitation is unpredictability. A simple issue that stems from this is flooding. Research has shown that during years of heavy rainfall, rivers' discharges have increased by as much as 35 percent. Being adjacent to three major river systems has resulted in mass flooding in years that have wiped out nearly 20 to 30 percent of annual yields. The extremely flat land in the Pampas only makes the damage worse [4]. Making matters worse is that mass floodings are often followed by dire droughts that prevent farmers from actually preparing for sowing or harvesting the next year [5].

Agricultural damage is only one side of the story. The flooding in the Pampas region actually has adverse effects on the manufacturing aspect of Argentina's economy. Several major Argentine cities are adjacent or part of the Pampas region, such as Santa Fe, Cordoba, the City of Buenos Aires, and Buenos Aires proper. These cities, with more than three million in population work in turning Pampas harvests into exportable goods [5]. It is essentially the industrial and commercial hub of the nation. Being so close to so many river basins actually make these cities vulnerable to climate change due to flooding. The floods have a dual impact in regards to the city. Floods have been a regular occurrence in the region since the early 2000's and there have been instances of a third of Santa Fe being flooded causing massive infrastructure damage and large casualties [4]. What is also important is the amount of disruption the floods create in terms of income and GDP, though the figures themselves have been scarce. Moreover, the added precipitation has been shown

to increase nearly 3.5% for every 1 degree Celsius the temperature in the Pampas increases. The total damage and cost to the Argentinian economy has been \$22.5 billion USD since 1980, accounting for 58 percent of all economic damages caused by natural disasters between 1966 and 2015 [6].

3.2. Extreme Temperatures for Agriculture and Infrastructure

While changes in precipitation have already caused enough problems for the Argentinian economy, the country and its industries also have to contend with rising temperatures. The region has already experienced high enough temperatures for it to be classified as extreme. Since 2013, temperatures in the summer have soared, with temperatures regularly rising above 40 degrees Celsius, making the country one of the hottest in the world [4]. The extreme heat has had adverse effects on the nation's plant biosphere, severely impacting the agricultural sector. Forest fires and droughts have affected harvests and even resulted in temporary collapses of the region's power grid [4].

The Pampas region produces wheat and corn, while providing grazing land for the country's most valued export product, beef. The rising temperatures of the last decade have had adverse impacts on the region. Temperatures have been increasing since the 1960's, with maximum, minimum, and mean temperatures in the Pampas increasing by more than 1 °C [3]. Warm days, warm nights, summer days, tropical nights, and both the coldest days and nights exhibited a considerably positive trend (2.3 °C, 0.7 °C, 43.6 days, 17.1 days, 0.9 °C, and 1.9 °C in the 59 years, respectively), implicating the presence of warming signals. What's more, frost days and cold nights demonstrated a negative pattern (12.3 days, 3.2 °C, and 2.4 °C in the 59 years, respectively) [3]. The issue that stems from the high temperatures is their effect on soil. Despite the extreme precipitation, the heat can dehydrate soil, and put pressure on the region's water supplies. The increase in temperature, which influences crop flowering, delays the growing season, and severely shortens the critical period for growth, resulting in a decrease in crop yield. High temperatures are not the only problem. Even though Argentina has not suffered from intense winters, the cooler springs are a parallel issue for the Pampas. The 1 °C median increase has resulted in far less yields from wild plants to the major wheat crops. (Magrin) For instance, it is revealed that in Mexico: good wheat yields are substantially correlated with a low average minimum temperature, and they proposed that a low average minimum temperature has a significant impact on wheat yields.

3.3. Infrastructure & Climate Change

The adverse effects of climate change are typically thought of as causing damage to a region's environment, but the unpredictable weather in Argentina is a root for Argentina's infrastructure degradation. There is roughly 240,000 kilometers of road in addition to a similarly large network of railways [6] all of which connect to air and water infrastructure. These nation's networks provide for internal mobility and connect Argentina to its neighbours. The complex transportation sector is critical to the nation's economic growth and development since it facilitates access to services and markets across the country [6]. Unfortunate hallmarks of Argentina's transportation infrastructure are poor construction and a limited capacity to withstand natural disasters. Climate change-induced hydrological extremes exacerbate these issues by routinely disrupting transportation and increasing expenses [6]. In addition to their economic and social consequences, these disruptions impede 45 million people's access to services, transit, and goods export. What's more, trends of multi-faceted infrastructure damage are already being foreseen due to these climatic and meteorological shifts: rising temperature has been responsible for 58 percent of the economic damage caused by natural disasters between 1966 and 2015. It is expected that climate change-related worries are expected to

have a 4.5 to 7% influence on Argentina's GDP, and transportation infrastructure failures due to climatic increase will cause a decrease in individual income [6].

Another example of climatic interruption to Argentina's economic makeup through infrastructure deterioration can be seen no further than the numerous prime instances of power grids failure in Buenos Aires, the capital of Argentina. While the region of Argentina and its neighboring countries were no strangers to the prevalence of power grid shutdowns (a nation-wide blackout had previously happened in 2019 due to excessive rain perceptions), local residents, including government officials, have described its recent case as “unprecedented”, leaving at least 700,000 people without electricity and trains, subways, and all other transportation services were halted. Undoubtedly, the episodes of historic heat waves are the predominant culprits to blame, but it is also evidence that such calamity is also a product of climate change. Rising ocean temperatures and heat waves have a negative impact on the functioning of power plants by deteriorating the transmission of their cooling systems. Transmission lines are nothing but just wires with restricted capacity. In truth, when the temperature increases, their capacity declines. This is compounded by the fact that when a transmission line transports a large amount of power, it heats up. The drooping of the line is caused by the expansion of the copper conductor in the line. If the line sags too far, it will come into contact with ground vegetation, resulting in a short circuit and the line's incapacity to further deliver energy. Because one line is no longer operational, other lines must pick up the burden, but they, too, become overloaded and vulnerable to the same problem of overheating, which ultimately goes out of operation.

4. Argentina's Climate Trap

As mentioned earlier, the role that climate change plays in terms of destroying the economic foundation of a nation and the per capita income of its citizens has been loosely explored. However, many of the links that have been made in South Asia and East Asia easily apply to the Argentinian context. Argentina itself treads the line between a middle-income and high-income nation [7]. This in particular places Argentina in a precarious position because its position as a high-income country is insecure.

Extreme heat is particularly devastating to Argentina's agricultural sector, which employs roughly 7% of its population [3]. One of the reasons why the decrease in yields has not necessarily ended with a collapse in the Argentinian economy has been a move to crops that are more responsive to high-heat, but with temperatures increasing consistently, several, like soybeans, have faced declining yields as well [3]. Another attempt to decrease the impact has been the redistribution of labour, as Argentina has tried to modernize and automate more of its agricultural sector, but the results are ultimately mixed, as not all the workers leaving the industry are able to find well-paid employment. Of course, none of this actually deals with the possibility that a few extra degrees in temperature could bring the entire industry to collapse.

The outcomes of extreme temperatures are more profound when these issues affect infrastructure. Flooding and extreme precipitation clearly affect agriculture as well, but there are few solutions to the issue that are not rectified by the same attempts to mitigate temperature. The Pampas area is surrounded by a number of the country's largest cities, all of which are engaged in the manufacture, development, and commercialization of the region's bounty. The extra water in the region is causing regular damage to roads, buildings, factories, and power stations, all of which bring industries to a standstill - even those that go beyond agriculture itself. Studies of East and South Asia have already pointed to the damage that climate change has on infrastructure, and Argentina is not immune to similar effects [8].

Even though Argentina has tried to reroute labour to other industries, any that is connected to the agricultural supply chain is likely to be affected, decreasing income across the board as production

and shipments are halted. The blackouts had exacerbated Argentina's deepening economic crisis, which has driven about a third of the population into poverty, skyrocketed interest rates, and caused the peso to collapse against the dollar, resulting in protests around the nation [9]. Changes that can affect the sustainability of resource development or manufacture would ultimately place Argentina at risk of slipping back into the middle-income [7]. This is much like how the debt crisis essentially placed Greece back into the trap after it had escaped. Argentina has largely tried to mitigate the latter issue by printing money in order to make up for shortfalls and stoppages, but borrowing against an economy that may be on the edge of a major recession, could ultimately undo the progress the country has made [10].

5. Conclusion

Argentina is on the verge of being middle to high-income due to its unskilled labor force; however, few would realize the underlying and yet substantial consequence of climate change on its major economic pillar - agriculture. A country's economy that relies predominantly on exports of agriculture is clearly affected economically by shifts in climate that result in drastic precipitation, infrastructure degradation, and unprecedented heat waves. Although the country's per capita income has risen, given the current climate change problems and the adverse impacts that accompanies them, it is surprising to discover that only a few constructive policy recommendations have been featured on how to avoid or move beyond it. With that, there are still a lot of unexplored avenues of studies that open up in light of my conclusion. Namely, how or what actions can be taken in battling the economic threats cast by the shadows of climate change, simultaneously, designing an ultimate solution for affected countries in a collective effort. Despite this study being majorly focused on the middle-income trap and what the underlying factors are causing it, one worthwhile next step would be to focus on low income countries and how tied their economic progress is to climate change. This could be important for high-income countries in Europe or North America in regards to how their industries or infrastructure could be affected as well, given that the context of Argentina may be eye -opening, but cannot be easily transplanted to other settings without a whole new study.

References

- [1] Nellari, Raj., Shahid, Yusef., Griffith, Brenda, Rwitwika, Bhattacharya. (2011). *Middle Income Trap. Frontiers in Development Policy. The World Bank.* <https://doi.org/10.1596/978-0-8213-8785-6>
- [2] Zhou, S., Hu, A. (2021). *What Is the "Middle Income Trap"?. In: China: Surpassing the "Middle Income Trap". Contemporary China Studies. Palgrave Macmillan, Singapore.* https://doi.org/10.1007/978-981-15-6540-3_1
- [3] Ferrelli, F., Brendel, A. S., Perillo, G. M., & Piccolo, M. C. (2021). *Warming signals emerging from the analysis of daily changes in extreme temperature events over Pampas (Argentina).* *Environmental Earth Sciences*, 80(12). <https://doi.org/10.1007/s12665-021-09721-4>
- [4] Barros, V. R., Boninsegna, J. A., Camilloni, I. A., Chidiak, M., Magr ń, G. O., & Rusticucci, M. (2015). *Climate change in Argentina: trends, projections, impacts and adaptation.* *Wiley Interdisciplinary Reviews: Climate Change*, 6(2), 151-169.
- [5] Barbier, E. B., & Hochard, J. P. (2020). *The impacts of climate change on the poor in disadvantaged regions.* *Review of Environmental Economics and Policy.*
- [6] Kesete, Y. Y., Raffo, V., Pant, R., Koks, E. E., Hall, J. W., Russell, T., & Paltan, H. (2021). *Climate Change Risk Analysis of Argentina's Land Transport Network.* <https://documents1.worldbank.org/curated/en/195711635419179910/pdf/Climate-Change-Risk-Analysis-of-Arentina-s-Land-Transport-Network.pdf>
- [7] Donner, Richard F. & Schneider, Ben Ross. (2016). *The Middle-Income Trap.* *World Politics*. 68(4), 508-644. <https://doi.org/10.1017/S0043887116000095>
- [8] Kohli, H. A., & Mukherjee, N. (2011). *Potential Costs to Asia of the Middle Income Trap.* *Global Journal of Emerging Market Economies*, 3(3), 291-311. <https://doi.org/10.1177/097491011100300303>

- [9] Jourdan, A., Misculin, N., & Raszewski, E. (2019). *Power mostly restored after massive blackout in Argentina, but questions remain, 1–1.*
- [10] Velasco, Andres. (2015). *Greece, Argentina, and the Middle-Income Trap. Columbia University Chazen Global Insights.* <https://www8.gsb.columbia.edu/articles/chazen-global-insights/greece-argentina-and-middle-income-trap>