**Slide 1:**

Hello everyone,

I’m glad to be here today to share my summer research paper with you. I appreciate your feedback and look forward to discussing it with you after the presentation.

**Slide 2:**

Climate change is moving fast, and we see its effects. For example, it snowed in Sweden last weekend, in the middle of spring! Policymakers have tried to slow down this change. They use tools like carbon pricing, taxes on emissions, and subsidies for green companies.

These actions affect the economy and not just emissions:

1. Limitation in fossil fuel usage: We're limiting one of the inputs for the production function
2. Adoption of renewable technologies: Companies are encouraged to use new, renewable technologies.
3. Shifting Resources: Economic Resources are moving to greener companies and away from less sustainable ones.

This leads to my research question: What is the economic outcome of these policies because of this reallocation? And by Economic outcomes, I mean Industry output, …

**Slide 3:**

My research draws from three distinct areas of literature:

First, the Effectiveness of Carbon Policies: This examines how well different policies reduce emissions. For example, research like Martinsson et al.'s has investigated the elasticity of carbon intensity to carbon taxes. I contribute by estimating the elasticity of substitution between green and brown capital in production, which is vital for answering my main question.

Second, The literature on Misallocation and Reallocation. They talk about the fact that resources in the Economy have not been allocated optimally and this leads to inefficiency. I will Revisit the Misallocation problem in the context of environmental policies.

Last, Climate Policy Design: This focuses on designing policies that effectively shift resources toward sustainable practices. I aim to analyze and compare these instruments to determine which are most effective at reallocating resources.

**Slide 4:**

Moving forward with my research approach, here's what I've done and plan to do:

1. Model Development: I began by writing down the economic model needed to explore the impacts of environmental policies on resource allocation.
2. Optimal Allocation: Next, I characterized the optimal way resources should be allocated under these policies to maximize efficiency.
3. Model Estimation: Currently, I am preparing to estimate this model using data from Sweden. This will help me understand how resources are being used in the economy compared to the ideal scenario.

Up to this point, I've completed the initial model and determined the allocation. I've calibrated this model to align with findings from Martinsson et al.'s study, which gives me some preliminary insights.

For the remainder of this presentation, I'll briefly review the model and discuss my unique contributions to it. Then, I'll share these initial results based on the model's calibration."

**Slide 5:**

In this slide, I'll discuss how I'm extending the Hsieh-Klenow 2009 framework, which is foundational to my analysis. Just like in their study, my model includes:

* Heterogeneous Monopolistic Competitive Firms: Firms vary in their operations and compete under monopolistic conditions.
* Cobb-Douglas Production Function: All the firms in the sector are using the same technology.
* CES Aggregator for Output, Partial Equilibrium

A significant addition to my model is the introduction the Emission to the economy. I calculate total emissions by summing up the emissions from each firm to understand the overall impact on the environment.

**Slide 6:**

In this part of my presentation, I'll explain how emissions are introduced into the model. Each firm, 'i' in sector 's', uses capital and labor to produce output, denoted as Y. Each firm operates under the sector’s technology but has a unique productivity level, which I denote as Â.

The capital, K̂, used by each firm is a mix of Brown and Green capital. The firm decides the proportions of each type of capital. These types of capital are crucial because:

* α\_s represents the importance of Green versus Brown capital in production.
* γ\_s indicates the ability to substitute between these two types of capital.

Emissions are primarily linked to Brown Capital. The function for emissions is a linear combination of Brown capital, with Ã representing the emission intensity.

In the simpler version of my model, which I’m presenting today, I focus only on Brown capital affecting emissions. However, I have also developed a version where labor and Green capital influence emissions, and I’m ready to discuss this complex model in one-on-one meetings afterward.

Beyond introducing emissions, the remaining aspects of the model follow standard economic theory: each firm minimizes production costs for a given output level and sets prices to maximize profits. I won’t detail these steps today, but I am more than willing to elaborate during individual discussions.

**Slide 7:**

Today, I'll share preliminary results from my model, which has been calibrated based on the summary statistics from Martinsson et al. We're focusing on the impact of carbon taxation on emission levels and total production. The graph I'll show has emission changes on the Y-axis and changes in output on the X-axis. The data clearly demonstrates that as the carbon tax increases, emissions decrease.

We have historical markers on the graph for context. In 1991, Sweden implemented a carbon tax of 250 SEK per ton, marked by a black cross. By 2013, this was raised to 1300 SEK per ton, shown as a black square. Alongside these markers, you'll see the calculated optimal ratios of Green to Brown capital for each year, indicated in blue. These ratios increased from 0.9 to 0.93 over this period, while emission intensity decreased, as shown by the red numbers.

Now, let's consider the impact of other policy types, like a tax on Brown capital. Imagine a scenario where there's a 100% tax on Brown capital, effectively doubling the cost of capital for firms from 5% to 10%. To achieve a reduction in emission intensity comparable to that seen with the 2013 emission tax, a staggering 170% tax on Brown capital would be required, which would increase the cost of capital from 5% to about 13%.

These findings illustrate that various policies can effectively reduce emissions. However, the economic impact, particularly the fall in output, varies significantly between these measures.