5. Conclusion

The distributional impact of a carbon tax is of direct relevance for its political feasibility. In chapter 2, I study together with Devi Brands the incidence of a carbon tax in the Netherlands considering the distributional effects both through changes in commodity prices and changes in factor prices. In contrast to most findings I encountered in the literature, I find the carbon tax to be progressive. I have developed and applied a static, two-sector general equilibrium model, which novelty lies in accounting for different levels of skill and corresponding differences in wages. I included both the production and the consumption side of the economy to study the impact of a carbon tax on relative commodity prices and factor prices.

The reduction of capital income through a lowering of the rate of return on capital causes inequality to be lower as a result of a carbon tax. This happens because in our calibration we find that energy-intensive industries are also capital-intensive, and hence a carbon tax is an indirect tax on capital. Another effect that influences the progressivity of a carbon tax is the concentration of high- and low-skilled workers within the energy-intensive industries. Changes in commodity prices, due to a carbon tax, increase income inequality because low-skilled and therefore low-income households spend a larger share of their income on carbon-intensive goods. Changes in factor prices, however, decrease inequality as high-skilled individuals own more capital, and energy-intensive industries are capital-intensive.

Although this chapter may not provide the definitive answer to whether a carbon tax is progressive for the Netherlands (and to what extent), it does confirm the importance of considering the factor channel and provides reason to differentiate with respect to types of
labour in analyses of the incidence of carbon taxes. I show that the relative distribution of skilled workers over sectors influences the progressivity of the tax through changes in relative wages.

Chapter 3 adds a new channel of income redistribution to already existing channels in the Mirrleesian framework. Aversion to income inequality is added directly as an argument into the utility function of households. I study optimal taxation, with and without the presence of an added Pigouvian externality tax. For each externality, income inequality or the environment, an extra term appears in the optimal income tax formula. Our framework can be used to explain political motives for taxes over the top of the Laffer curve. It is shown that in the optimum the marginal cost of public funds is still equal to unity. In suboptimal preexisting tax systems there is opportunity for a double dividend, and the optimal tax reform is found when implementing an environmental tax.

There might be many reasons to like or dislike income inequality, so I add an alternative view to the common practice in the public finance literature where income inequality aversion is solely addressed by taking into account different levels of marginal utility of consumption for agents with different productivity levels. In order to consider different distributional preferences, we take varying levels of inequality aversion, where we find a new way to the familiar trade-off between work incentives and equity: the balance between labour incentives and income inequality. As a result, we find that there are preferences that lead to income taxation on the right side of the Laffer curve.

In chapter 4 I study together with Mark Kagan optimal climate policy in a calibrated model that includes not only an exhaustible resource with a stock-dependent extraction cost, but also an infinitely elastic supply of both an expensive clean and a cheap dirty backstop. I focus on the case where a first-best tax is unavailable, and the planner has to rely on an optimal renewables subsidy. Assuming oil is cheap at the start and renewables are expensive, I find that depending on the calibration of the model there are two possible sequences of energy inputs. First, oil-only followed by oil-coal followed by a renewables-only regime. Second, oil-only followed by oil-coal, followed by coal-only, followed by a renewables-only regime. After calibrating the model to real-world values I find that when optimal
environmental policy is pursued the economy never switches to only coal. Instead oil and coal are burned simultaneously until renewables are phased in. This means the ordering does not depend on just the costs of the fuels, but on their emission coefficients as well (which determine the relative social cost of the different fossil fuels). Compared to the laissez-faire outcome, renewables are introduced in the social optimum once the environmental damages outweigh the benefits of the lower price of renewables.

I find that in the optimal subsidy case the sequence of resource regimes is oil-only then coal-only then renewables, and that no Green Paradox occurs as a consequence of introducing the subsidy, when a dirty backstop is present. After calibrating to real-world values, I find it is optimal to subsidize renewables after coal is introduced. As a result, even the optimal subsidy performs comparatively poor at combatting climate change compared to a first-best tax, allowing excessive carbon emissions from dirty coal and leading to significant damages due to climate change. It is therefore important to be wary of using subsidy tool as a policy instrument.

The optimal renewable subsidy results in renewables being phased in after oil is phased out but significantly earlier than in the first-best case. A subsidy results in a green welfare improvement over the market outcome, but between the optimal subsidy and the first-best policy there is a substantial welfare gap. This gap is due to excessive coal consumption before renewables are phased in. To explain this, the high cost of renewables makes subsidies expensive, while cheap and dirty coal leads to excessive pollution when unchecked by a carbon tax. While the expensive nature of renewables subsidies can makes it optimal (in the absence of a tax on carbon) to introduce them later, this can cause substantial loss of green welfare. I thus conclude that a subsidy on renewable energy is hardly welfare improving compared to the sizable benefit of a carbon tax.

The main policy-relevant result of this chapter is that when a dirty backstop is available, renewable energy subsidies are inferior to the first-best carbon tax to address negative externalities of carbon emissions. This chapter can thus be read as a warning about an important mechanism: when renewables are subsidized, the market for fossil fuels is distorted, so that the positive welfare effect will be small. Thus I conclude that a policymaker should push
for a carbon tax by any means possible and ignore the politically convenient but ineffective renewables subsidy to prevent or limit the negative external effects of carbon emissions unless there are substantial positive side-effects to this subsidy such as learning-by-doing or technological change.