# THE DISTRIBUTIONAL CONSEQUENCES OF ENVIRONMENTAL TAX IN THE LABOR MARKET

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Environmental policies kill jobs (Greenstone, 2002; Walker, 2011; Kahn and Mansur, 2013; Curtis, 2017), and the unemployment effects are concentrated at lower educational levels (Yip, 2018). The distributional consequence increases the regressivity of environmental policies and raises concerns on the labor market analog of environmental justice (Yip, 2019). However, works that explore the distributional consequences of environmental policies in the labor market are rare and inadequate to fully understand the impacts of environmental policies on the labor market.

This paper addresses distributional questions—how environmental policies shape the labor market structure. In addition to the policy effects on the wage and the unemployment distributions, this paper answers how environmental policies affect the distributions of worker types across industries and the distributions of welfare across worker types. As noted by Rausch and Schwarz (2016), the public acceptance of environmental policies depends on their distributional consequences. "*The distributional impacts of [environmental] policies clearly are highly relevant to social welfare, and such impacts often critically influence political feasibility*" (Bovenberg et al., 2005). Examining the distributional consequences speaks directly to the public concern and enhances our understanding of how environmental tax as a policy tool and a sectoral demand shock shapes the labor market. Undoubtedly, policymakers could be interested in the distributional consequences to redistribute social benefit accordingly.

However, standard empirical approaches, such as the difference-in-differences method and the regression discontinuity design, fail to answer the research question for several reasons. First, these approaches are originally designed to recover the average policy effect on labor market outcomes, not their distributional consequences. Second, most of these microeconometric techniques neglect general equilibrium effects. As pinpointed by Hafstead and Williams (2018), "*these studies often employ a difference-in-differences approach, using firms in unregulated industries as controls... such studies will not only miss the effects on unregulated firms*

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*but also yield biased estimates of the effects on regulated firms*". Third, a few studies attempt to correct selection biases. Econometricians do not observe the wages of unemployed workers. While the unobserved characteristics of employed and unemployed workers are unlikely identical, the exclusion of the unemployed from the sample may lead to severe selection biases. Yip (2019) finds that such biases could be substantial: they underestimate the adverse wage effect of carbon tax by 42 percent. These reasons partly explain why we lack conclusive empirical evidence regarding the distributional issues.

Instead of adopting the standard empirical approaches, we develop a search equilibrium model to investigate the distributional consequences of environmental policies. Our model extends the two-sector search equilibrium model of Sun and Yip (2018) by incorporating heterogeneity in productivity between and within demographic groups. Our model preserves the features of sectoral reallocation and allows for decisions on the extensive and the intensive margins of emission as in Sun and Yip (2018), all of which are shown empirically important for emission controls and measuring social costs associated with environmental policies (Shapiro and Walker, 2018; Walker, 2011, 2013). Moreover, it allows us to measure the impacts of environmental policies on (i) the within-group wage distribution, (ii) the between-group wage distribution, (iii) the unemployment distribution across demographic groups, and (vi) the distributions of worker types and to quantify the welfare cost of environmental policies through the redistributions of wages and jobs.

We calibrate our model to the Canadian province of British Columbia (BC) to quantify the distributional consequences of BC's revenue-neutral carbon tax. The policy was introduced in BC in July 2008 and was revenue-neutral: the tax revenue was returned to the public through lump-sum transfer to poor households and the reduction in the corporate tax rate. Carbon tax creates unemployment, and the reduction in the corporate rate mitigates the unemployment effect by encouraging job creations. Hence, the more the tax revenue is allocated to reduce the corporate tax, the smaller the unemployment effect. Our simulation exercise shows that BC's revenue-neutral carbon tax increases unemployment if the entire tax revenue is transferred to the poor in a lump-sum manner. When the entire tax revenue is recycled to reduce the corporate tax rate, unemployment drops. We pin down the unique allocation of the tax revenue between the reduction in the corporate tax rate and the increase in the transfer such that the revenue-neutral carbon tax has no effects on overall unemployment. This unemployment-equivalent carbon tax policy reduces the unemployment of high-educated workers but increases the unemployment of their low-educated counterparts.

We simulate the economy under counterfactual environmental policies to conduct welfare analysis. There exist welfare tradeoffs between the reduction in the corporate tax and the transfer. The wage and the unemployment effects of carbon tax are concentrated on low-educated young males and are thus regressive in the labor market. The reduction in the corporate tax rate

amplifies this regressive nature: workers with higher productivity levels tend to receive higher wages and thus benefit more from the tax reduction.[1] Moreover, the reduction in the corporate tax rate stimulates job creations and increases tax revenues. On the other hand, the transfer to the poor dampens the regressivity because it compensates the wage and the job losses of the poor. The carbon tax policy with the optimal allocation between corporate tax and transfer departs from the unemployment-equivalent carbon tax policy, leading to the political tradeoff between efficiency and employment.

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[1] Here, we assume that wages are bargained through Nash-bargaining so that wages and after-tax profits are positively related.

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