

## **Genetic Instrumental Variable Analyses of the Effects of Smoking on BMI**

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### **Abstract**

Several studies have evaluated whether the high and rising obesity rates over the past three decades may be due to the declining smoking rates. There is mixed evidence across studies – some find negative effects of smoking and positive effects of increasing cigarette costs on body weight, while others find opposite effects. This study applies a unique approach to identify the smoking effects on body weight by utilizing genetic instruments for cigarette use. These are genetic variants that impact smoking but are otherwise unrelated to body weight either directly or through unobserved confounders. Further, the study evaluates the heterogeneity in smoking effects across the body mass index (BMI) distribution, estimates the smoking effects on body weight categories and assesses the effects of cigarette quitting on calorie intake and alcohol use. The study employs a data sample of 1,057 mothers from Norway who were interviewed after delivery. The study finds significant heterogeneous effects of cigarette smoking during the past 12 months before pregnancy on BMI at pregnancy – cigarettes increase BMI at low/moderate levels and decrease BMI at high levels. Further, cigarettes decrease underweight probability, increase overweight probability and have an insignificant negative effect on obesity. Finally, cigarette quitting in the first pregnancy trimester increases the probability of high caloric intake, and may not decrease alcohol use. These results indicate potential tradeoff effects on body weight with increasing cigarette costs, as well as a potential two-way secondary adverse effect - the thin becoming thinner and the obese becoming more obese. This heterogeneity may explain some of the inconsistencies of previous studies, which focus on “mean effects”.