

The Labor Market Effects of GLP-1s: Evidence from Weight Management and Diabetes Cohorts

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Abstract

Using population-wide administrative microdata from Denmark, we provide the first comprehensive empirical evaluation contrasting the causal labor market effects of GLP-1 receptor agonists across their dual therapeutic tracks: a subsidized diabetic cohort (Ozempic) subject to public reimbursement, and a weight-management cohort (Wegovy) paying entirely out-of-pocket. Exploiting variation in individual prescription timing among eventual users, and validated by a battery of robustness checks leveraging treatment dropouts, alternative insulin baselines, and matched stacked designs, we find robust labor supply expansions that sharply differ by track. For the subsidized diabetes cohort, treatment initiation raises the probability of employment by 4.1 percentage points and quarterly hours worked by 19.5 hours. Conversely, for out-of-pocket weight-management cohorts, employment effects are flat, but the intensive labor supply expands by 29.7 hours per quarter conditional on employment. Wage effects are statistically insignificant across tracks, confirming that labor earnings gains are quantity-driven. Integrating these micro-elasticities into a public finance accounting framework, we show that price regulations shrink the standalone diabetic deficit, while weight-management cohorts generate substantial, pure income tax windfalls that naturally stabilize public health budgets.

Keywords: Pharmaceutical, Semaglutide, Labor supply, Cost-sharing structures, Reference pricing, Weight-Management, Diabetes, Public health budgets, Danish registries

JEL Classification Codes: L65, L51, I11, I18, H51, J22

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1. Introduction

Health conditions such as diabetes, obesity, and their associated metabolic co-morbidities represent some of the most pressing public health crises of the twenty-first century. They carry profound implications for individual labor productivity, lifecycle human capital investment, and the sustainability of social insurance systems. Extensive previous empirical work has established that obesity-related health impairments, particularly an elevated body mass index (BMI), create substantial barriers to labor supply by suppressing employment probabilities, reducing weekly hours worked, and depressing lifecycle labor earnings (O'Donnell et al., 2015; Blundell et al., 2023; Margaritis and Wallenius, 2026). Over the last decade, these economic penalties have been fundamentally challenged by the introduction of highly effective weight-loss pharmacotherapies. The most well-known of these are glucagon-like peptide-1 (GLP-1) receptor agonists (which include semaglutides such as Ozempic and Wegovy), and dual gastric inhibitory polypeptide (GIP) agonists (which are used in tirzepatides such as Mounjaro). While an expansive clinical literature demonstrates the unprecedented efficacy of these innovations in generating positive health outcomes, their direct economic consequences for individual labor supply and empirical behavior remain largely unexplored.

This paper provides the first comparative empirical evaluation of the labor market effects of widespread weight-loss pharmacotherapy between two distinct therapeutic tracks. We exploit a unique institutional setting in Denmark to distinguish between two complementary cohorts subject to entirely different public cost-sharing structures: (1) individuals who receive public reimbursement for their use of semaglutide as a treatment for Type 2 diabetes (marketed as Ozempic), and (2) individuals who pay entirely out-of-pocket for chronic weight management (marketed as Wegovy). Using linked, population-wide administrative microdata, we exploit quasi-experimental designs to identify the causal impacts of semaglutide adoption on discrete labor market outcomes. Our primary empirical design exploits variation in individual prescription timing among eventual users. To ensure the causal validity of these parameters against potential unobserved health trends, we complement this staggered difference-in-differences framework with exhaustive robustness checks, including evaluations of continuous versus early interrupted treatments (dropouts), comparisons against alternative clinical baselines (insulin versus semaglutide), and a propensity-score-matched stacked event study.

Denmark provides an ideal institutional context for this study, as the country was a pioneer in semaglutide development and was among the earliest global adopters of these medical technologies. Initially introduced in 2018 under the brand name Ozempic, semaglutide was strictly indicated for Type 2 Diabetes. However, off-label prescriptions for weight management rapidly

expanded due to the drug’s profound efficacy in reducing body mass. By 2022, approximately 33 percent of Ozempic users in Denmark did not have a diabetes diagnosis (Mailhac et al., 2024), reflecting significant out-of-pocket adoption for chronic weight management. This therapeutic space was formalized later that year with the introduction of Wegovy, a semaglutide formulation explicitly approved for obesity management. This dramatic expansion allows us to track the concurrent evolution of joint Ozempic and Wegovy prescriptions and new patient inflows over time across separate reimbursed and non-reimbursed institutional channels.

Leveraging individual-level administrative data linked across demographic registries, longitudinal labor-market histories, and the National Prescription Registry, we construct a quarterly panel following individuals around the exact timing of semaglutide initiation between 2018 and 2024. Evaluating the causal impact of semaglutides on labor-market outcomes—including employment, total and conditional hours worked, total and conditional labor earnings, and hourly wages—introduces a fundamental selection challenge: individual uptake is highly endogenous, driven by unobserved health trajectories, disease severity, treatment preferences, and forward-looking labor-market choices.

Our main empirical design addresses this selection bias by exploiting variation in the timing of semaglutide treatment initiation among eventual users. In our first sample, we compare earlier semaglutide initiators to later initiators, while restricting attention to individuals who initiate semaglutide treatment within six quarters of their first insulin prescription. This design holds fixed eventual take-up and compares individuals at a broadly similar stage of diabetes treatment progression. Our second sample conditions on Body Mass Index (BMI), restricting our focus to non-diabetic individuals with a prior clinical overweight or obesity diagnosis, defined as a BMI ≥ 25 . This comparative strategy allows us to distinguish between labor market effects driven by direct health remediation under public subsidies versus those driven by weight loss under full out-of-pocket payments.

We complement this primary design with three robustness exercises for the Ozempic treatment and two for the Wegovy treatment. These methodologies leverage alternative sources of identifying variation: a comparison of continuous versus interrupted semaglutide use driven by idiosyncratic gastrointestinal side-effect tolerances (dropout sample), an event-study comparison of individuals whose first relevant diabetes treatment is semaglutide versus insulin only (insulin sample), and a propensity-score-matched (PSM) stacked difference-in-differences design where treated individuals are balanced on detailed pre-treatment diagnostics and disease-duration tracks. Together, these complementary methodologies further address potential selection biases. In particular, we acknowledge that by anchoring our primary design for the diabetic cohort to initial

insulin tracking, our main design strategically leverages a cohort navigating advanced or heavily managed stages of diabetes progression. While this restriction successfully minimizes unobserved health-severity sorting among early and late adopters which is critical for identification, it shifts focus away from clinical settings where guidelines increasingly position GLP-1s as early-stage therapies prior to insulin use. To ensure our causal parameters are not artifacts of selection into this advanced-severity subpopulation, we explicitly relax this sample constraint across our robustness checks by evaluating alternative clinical paths that track semaglutide as a first-line treatment (insulin sample) and implementing a PSM layout balanced across full disease-duration tracks.

Across both our main design and robustness exercises, we find robust, economically meaningful expansions in labor-market attachment following semaglutide initiation, though the main channel driving these effects differs across therapeutic tracks. In our preferred staggered-adoption specification for the subsidized diabetic cohort (Ozempic), treatment initiation raises the probability of employment by 4.1 percentage points and total hours worked by 19.5 hours per quarter. Conversely, for the out-of-pocket weight-management cohort (Wegovy), extensive-margin effects are limited, but intensive labor supply expands by 29.7 conditional hours per quarter, generating a significant conditional quarterly earnings increase of DKK 7,589. Wage effects are small and generally statistically insignificant across cohorts, proving that these observed labor earnings increases reflect a quantity-driven labor supply response rather than shifts in hourly wages.

The joint tracking of these dual therapeutic tracks uncovers a fundamental microeconomic heterogeneity. The labor market effects operate on entirely different behavioral margins depending on a population's baseline workforce attachment. For sicker populations with weaker baseline attachment (diabetic cohort), the technology yields returns primarily on the extensive margin, drawing vulnerable individuals back into active employment. Conversely, for healthier, prime-age lifestyle cohorts (weight-management cohort), the scope for extensive entry is naturally limited, concentrating capacity gains entirely along the intensive hours margin. Further, within the weight-management cohort, alternative identification strategies that we develop for robustness—including evaluations of early treatment dropouts and propensity-score matching—reveal significant, positive extensive-margin effects. Overall, this variation highlights how different comparison groups isolate distinct layers of baseline selection and extensive-margin effects, while confirming that the large intensive-margin response remains highly robust across all specifications.

Finally, we integrate these heterogeneous micro-elasticities into a dynamic public finance accounting framework to evaluate aggregate fiscal sustainability under shifting regulatory regimes. Our simulation demonstrates that under the 2023 peak pricing regime —where annualized public subsidies reached DKK 14,130 per patient—the standalone diabetic track runs a net fiscal deficit

of DKK 8.00 million per 1,000 users, requiring an out-of-pocket weight-management cohort ratio of 0.59 to clear the state’s budget. However, we show that the tighter step-therapy clauses and compressed reference pricing caps enacted in 2024 reduce per-patient public outlays to DKK 8,695, shrinking the standalone deficit to DKK 2.56 million and plunging the cross-cohort fiscal break-even boundary to a user ratio of just 0.19. These aggregate dynamics confirm that unsubsidized weight-management cohorts act as a powerful fiscal stabilization anchor, generating massive income tax windfalls through intensive hourly expansions (+29.7 conditional hours) that naturally insulate and self-balance single-payer health budgets.

Related Literature. Our findings relate directly to a concurrent literature mapping the labor market consequences of metabolic breakthroughs, anchored by Diamond (2026) in the United States and Daysal et al. (2026) in Denmark. Diamond (2026) documents large labor supply responses to weight-loss semaglutides using US survey data, and Daysal et al. (2026) find a reduction in the number of sick days and near-zero extensive-margin effects among all semaglutide users. While our weight-management estimates are broadly consistent with the labor supply expansions documented by Diamond, our institutional setting uniquely allows us to isolate these behavioral adjustments conditional on public subsidies. Specifically, our paper breaks new ground by contrasting the labor market outcomes of an unsubsidized weight-management track against a subsidized diabetic track. This comparative approach maps out how differing cost-sharing structures and baseline health sorting interact to shape the micro-elasticities of labor supply. We document margins of heterogeneity: whereas the diabetic track responds along both the extensive and intensive margins, the weight-management cohort adjusts exclusively along the intensive margin, albeit with a substantially larger hours expansion. We assess how this structural heterogeneity in micro-elasticities carries implications for the fiscal sustainability and design of public health budgets.

Second, our paper links our reduced-form parameters to an accounting evaluation of public health budgets, pharmaceutical regulation, and single-payer fiscal tracking. While standard health economics approaches evaluate medical innovations primarily through localized clinical cost-effectiveness panels (Drummond et al., 2015; Sanders et al., 2016), we use our empirical elasticities to discipline a stylized cross-cohort public finance accounting framework. In doing so, we relate our work to the public economics literature mapping how institutional health policies, price constraints, and cost-sharing boundaries alter aggregate public accounts (Bhattacharya and Bundorf, 2009; Cutler, 2011). We provide an accounting illustration of how specific regulatory policy levers—including manufacturer price adjustments and the tightening of conditional reference pricing caps (Kaiser et al., 2014; Dubois, 2025)—interact with labor market income tax pass-throughs. Our numerical simulation shows that while the subsidized diabetic track does not

immediately self-fund through income taxes alone, maintaining a strict non-reimbursement status for obesity formulations can serve as a vital fiscal stabilizer. By allowing out-of-pocket weight managers to fund their own care while generating intensive labor tax windfalls, this bifurcated policy boundary helps naturally balance a universal single-payer health budget under binding fiscal constraints.

Third, our paper also contributes directly to two major strands of the literature in health economics. We add to the extensive empirical and health economics literature evaluating the consequences of obesity, body mass index (BMI), and metabolic health on labor market attachments and lifecycle earnings dynamics (Rooth, 2009; Cawley, 2015; Caliendo and Gehrsitz, 2016). While an established reduced-form consensus documents a persistent labor market penalty associated with elevated body mass—particularly among female workers—disentangling the underlying mechanisms has historically proven challenging. Extant literature largely attributes these penalties to pure taste-based or statistical discrimination in hiring markets (Rooth, 2009), customer-side aversion in socially intensive occupations, or the structural pass-through of employer-sponsored health insurance expenditures (Bhattacharya and Bundorf, 2009). Finally, focusing more generally on health, De Nardi et al. (2024) show that general health shocks drive massive lifecycle labor drops. We are bringing clean empirical data on a new medical technology (GLP-1s) that selectively treats one of the most prominent, modifiable physiological inputs to that broader health-capital stock.

The remainder of the paper is organized as follows. Section 2 details the Danish institutional setting and microdata registries. Section 3 outlines our quasi-experimental identification strategies and presents our causal econometric frameworks. Section 4 presents the core dynamic event-study estimates and details our empirical results across employment, hours, earnings, and wages. Section 5 evaluates the net public finance implications and cross-cohort fiscal multipliers. Section 6 concludes.

2. Institutional Context

GLP-1 therapies, pioneered by the semaglutide molecule—marketed as Ozempic for Type 2 diabetes and Wegovy for obesity—have reshaped metabolic care and the public economics of chronic disease in less than a decade. Developed in Denmark, they pair large clinical effects with exceptionally rapid uptake, which has in turn forced a sequence of pricing and reimbursement decisions that make Denmark a uniquely legible laboratory for our study. This section documents the discovery and diffusion of the drugs and the evolving price and reimbursement regimes.

2.1. Discovery and Diffusion

As cataloged in the market taxonomy in Table A1, GLP-1 is a hormone released by the gut after eating; it tells the pancreas to produce insulin. Researchers identified it in the 1980s, among them the Danish physiologist Jens Juul Holst at the University of Copenhagen, whose work laid the scientific foundation for Novo Nordisk's drug programme (Allen, 2024a). The first drug to target this pathway (exenatide) launched in 2005, followed by liraglutide marketed as *Victoza* for diabetes and, at a higher dose, as *Saxenda* for obesity (2014). Semaglutide is a long-acting analogue whose extended half-life permits once weekly dosing. The U.S. Food and Drug Administration (FDA) approved injectable semaglutide for type 2 diabetes (*Ozempic*) in December 2017, and the European Medicines Agency (EMA) followed on 8 February 2018 (Konkurrence-og Forbrugerstyrelsen, 2024); an oral formulation (*Rybelsus*) was approved in 2019.

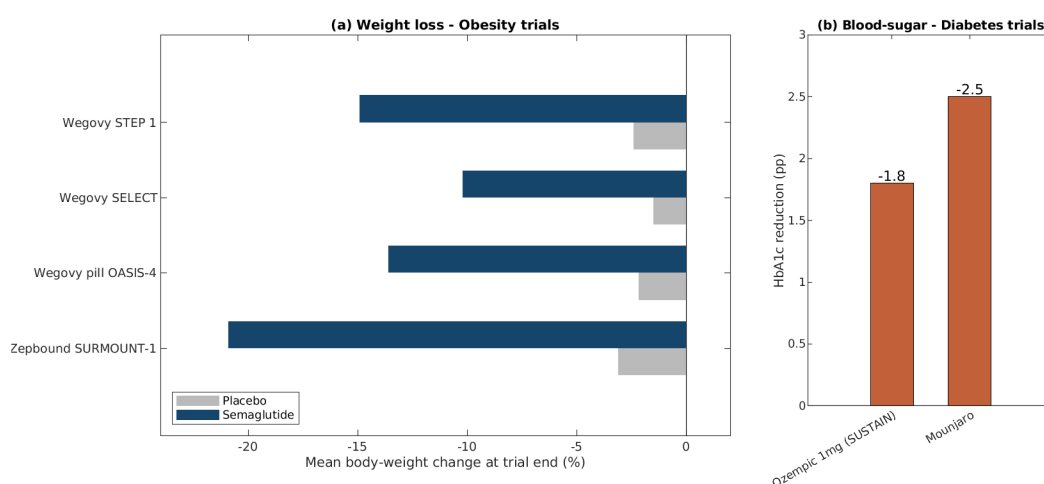


Figure 1: Clinical efficacy of GLP-1: trial means

Notes: Panel (a) shows mean body-weight change at trial end for treatment versus placebo; panel (b) shows HbA1c reduction (percentage points) in diabetes trials. Sources: STEP 1 (Wilding et al., 2021); SELECT 4-year (Lincoff et al., 2023); Wegovy oral (OASIS-4, EMA assessment) (Wharton et al., 2025); SURMOUNT-1 (tirzepatide 15 mg) (Jastreboff et al., 2022); SUSTAIN/Mounjaro HbA1c per EMA assessment reports (European Medicines Agency, 2022b).

Ozempic entered the Danish market in 2018 and received general (conditional) reimbursement status from the Danish Medicines Agency on 2 May 2018 (Konkurrence-og Forbrugerstyrelsen, 2024). Uptake was steep. The number of Ozempic injection pens dispensed in Denmark reached 977,260 in 2023, an increase of roughly 200 percent relative to 2020 (an average annual growth rate of about 45 percent); the number of users rose from about 35,000 in 2020 to nearly 92,000 in 2023 (Konkurrence-og Forbrugerstyrelsen, 2024). Figures 2a and 2b trace this expansion at quarterly

frequency for joint Ozempic and Wegovy prescriptions and for new patient inflows, separately for reimbursed and non-reimbursed channels.

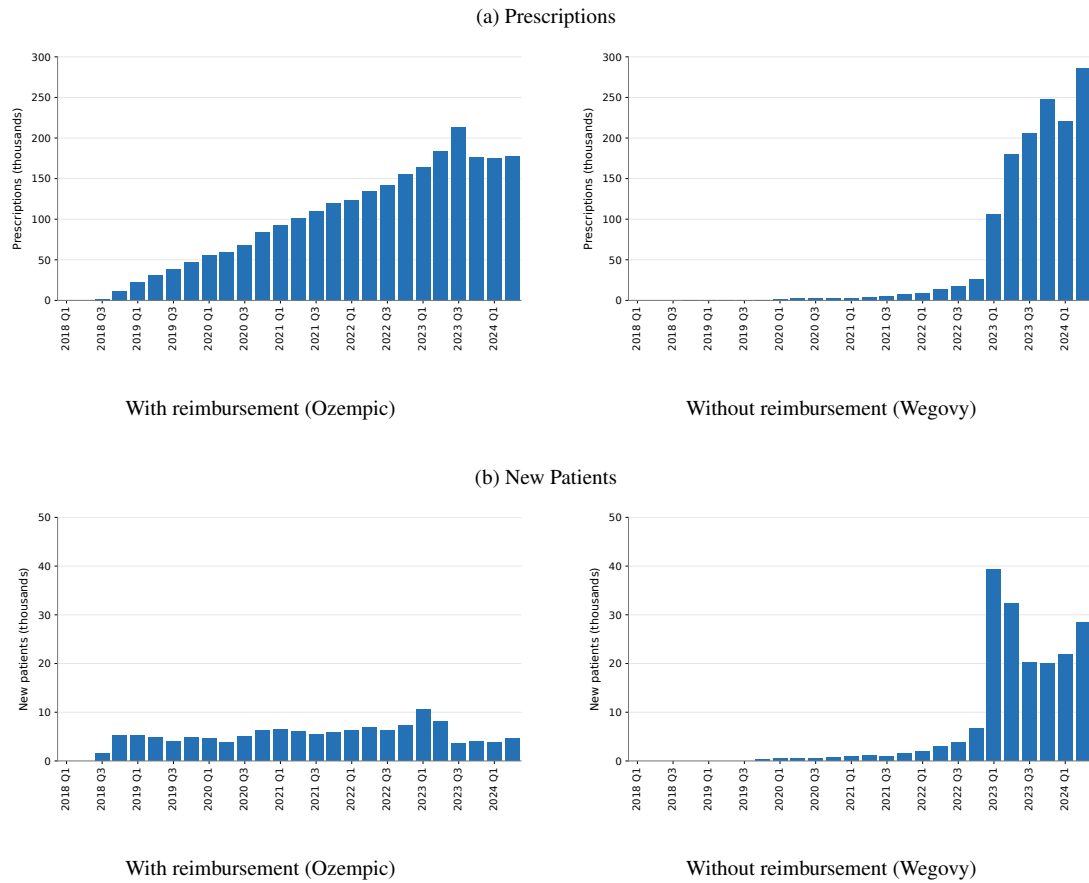
Higher dose semaglutide (2.4 mg), branded *Wegovy* for obesity, was approved by the FDA on 4 June 2021 and received an EU marketing authorization on 6 January 2022 (European Medicines Agency, 2022c). Its Danish roll out began in 2023 and was initially constrained by global supply shortages and by strong demand from non-diabetic populations. Because *Wegovy* is not publicly reimbursed for the obesity indication in Denmark (Section 2.2), its diffusion has been concentrated in out-of-pocket private prescriptions (Allen, 2024a). The competitive landscape broadened in parallel with the dual GIP/GLP-1 agonist tirzepatide: *Mounjaro* (for diabetes) obtained an EU authorization on 15 September 2022 (European Medicines Agency, 2022a), and the obesity formulation *Zepbound* was approved by the FDA on 8 November 2023, with the EU weight management indication following in 2024.

GLP-1 lowers blood glucose in a glucose-dependent manner while also slowing gastric emptying and acting on central appetite circuits to increase satiety and reduce food intake. Clinically meaningful weight loss first surfaced as a *secondary* outcome in the diabetes (SUSTAIN) program, where semaglutide reduced glycated haemoglobin (HbA1c) by roughly 1.4-1.8 percentage points and lowered body weight by several kilograms. This motivated a dedicated higher dose obesity program (STEP). In the pivotal STEP 1 trial, once-weekly semaglutide 2.4 mg produced a mean weight change of -14.9% versus -2.4% on placebo over 68 weeks, with 86.4 percent of treated participants losing at least 5 percent of body weight (Wilding et al., 2021). The SELECT cardiovascular outcomes trial subsequently showed a 20 percent reduction in major adverse cardiovascular events among 17,604 adults with established cardiovascular disease and overweight or obesity but *without* diabetes, with weight loss of about 10 percent sustained over four years (Lincoff et al., 2023). Note that withdrawal of semaglutide is followed by regain of roughly two-thirds of the lost weight within a year (Wilding et al., 2022), underscoring the chronic, maintenance-dependent character of the therapy. Figure 1 summarises the published trial means for body weight and HbA1c across the principal obesity and diabetes studies.

2.2. Subsidies and Price Regulation in Denmark

Since its 2018 introduction for type 2 diabetes, Ozempic has been covered within Denmark's tax-financed reimbursement system. List pricing is formally free, but effective patient out-of-pocket costs are strictly governed by national reimbursement thresholds, stepped reference pricing mechanisms, and pharmacy substitution rules. Reimbursement is structured as a stepped, conditional (*klausuleret*) subsidy whose generosity rises with a patient's cumulative annual drug spending, subject to an annual out-of-pocket ceiling of DKK 4,575 in 2024 (indexed upward an-

Figure 2: GLP-1 Semaglutide Take-Up Over Time Across Therapeutic Tracks, 2018-2024



Notes: Panel (a) reports the quarterly number of semaglutide prescriptions across therapeutic tracks: a subsidized diabetic cohort (Ozempic) subject to public reimbursement, and a weight-management cohort (Wegovy) paying entirely out-of-pocket. Panel (b) reports the quarterly number of individuals initiating semaglutide treatment across therapeutic tracks. Within each panel, the left-hand figure shows prescriptions or new patients for the subsidized cohort, and the right-hand figure shows those for the unsubsidized cohort. Prescriptions and new patients are measured in thousands.

nually); the ceiling was temporarily lowered to DKK 3,075 between 3 April and 29 October 2023 (Konkurrence-og Forbrugerstyrelsen, 2024). Because Ozempic is expensive and taken continuously, many patients quickly reach full reimbursement: across all strengths in 2023, regional reimbursement covered about 85 percent of suppliers' Ozempic turnover, with patients paying the remaining 15 percent (Konkurrence-og Forbrugerstyrelsen, 2024).

2.2.1. A sharp, policy- and competition-driven decline in prices

For most of their history these medicines carried very high U.S. list prices, historically exceeding \$1,300 per month (one injection pen per week for four weeks), with Wegovy listed at \$1,349 and Ozempic in the \$936 to \$1,028 range (Allen, 2024a; Novo Nordisk, 2026). Two forces have since driven prices down. The first is *competition*: Eli Lilly's tirzepatide entered the obesity market as *Zepbound* in November 2023 at a list price of about \$1,060 (roughly 20 percent below Wegovy), and international generic semaglutide, priced as low as \$13 to \$44 per month in some markets, is expected to launch in jurisdictions such as China and Brazil from around 2026, although U.S. patent protection extends this horizon to roughly 2032 (Allen, 2024a). The second is *strategic and regulatory pressure on the innovator*. Through 2025 Novo Nordisk opened a direct-to-consumer self pay channel, cutting the cash price of Wegovy and Ozempic from \$650 to \$499 (March 2025) and then to \$349 (November 2025), and introduced an oral self pay option from \$149 per month; following an agreement with the U.S. administration, the company announced that effective 1 January 2027 it would cut the list (wholesale acquisition cost) of all semaglutide products to \$675 per month, that is reductions of about 50 percent for Wegovy and 35 percent for Ozempic (Novo Nordisk, 2026).

2.2.2. The fiscal footprint of semaglutides in Denmark

The Danish reimbursement debate was driven primarily by the rapid growth in aggregate expenditure. Following semaglutide's introduction in 2018, public reimbursement—overwhelmingly for Ozempic, since Wegovy is unsubsidised—reached approximately DKK 642 million in 2022 and DKK 1.3 billion in 2023. Although the 2023 expenditure represented only 0.046 percent of Danish GDP, it accounted for approximately 16 percent of the regions' medicine-reimbursement budget. For comparison, annual turnover for the entire insulin category (ATC group A10A) had remained broadly stable at DKK 0.5–0.6 billion for decades (Søgaard, 2020; Konkurrence-og Forbrugerstyrelsen, 2024). The pressure was therefore concentrated within pharmaceutical budgets. As one of the drug's co-inventors put it, surging weight-loss prescribing “emptied all the money boxes in the entire public health system” (Allen, 2024a). Following the 2024 price cut and tighter reimbursement conditions, public reimbursement fell to approximately DKK 800 million in 2024

and DKK 246 million in the first half of 2025 (Medicinsk Tidsskrift, 2025a).

In sum, Denmark’s regulation of semaglutide evolved from an open price system with standard diabetes reimbursement (2018 to 2023), through a phase of binding budget pressure that produced both a manufacturer price cut and a tighter reimbursement clause (2024), to a confidential pricing pilot and adaptive reimbursement (2025 to 2028). For the obesity indication, prescription-only status applies but public reimbursement has so far been withheld. These institutional features, a tax-financed payer, a fixed regional drug budget, a sharp distinction between a reimbursed diabetes indication and an unreimbursed obesity indication, and a documented behavioural response to reimbursement rules, are features that this paper navigates to identify labor-market effects and conduct optimal subsidy design.

3. Empirical Strategy

This section describes the identification strategy in Section 3, where we introduce our preferred staggered-adoption design and the robustness exercises based on treatment persistence, semaglutide-versus-insulin comparisons, and propensity-score matching. Section 3.3 describes the estimation samples, baseline characteristics, and outcome definitions.

Estimating the effect of GLP-1s on labor-market outcomes is complicated by endogenous treatment take-up. Individuals who initiate GLP-1 therapy may differ from non-users, or from later users, in underlying health, labor-market attachment, preferences for work, and expectations about future health. Our empirical analysis therefore relies on one preferred design, supported by robustness exercises that use alternative comparison groups and related sources of identifying variation.

In our main design, we exploit variation in the timing of GLP-1 initiation among eventual users. Within this class of medications, we focus on semaglutide formulations, which comprise the lion’s share of the GLP-1 market in Denmark. We include two different samples, one for reimbursed formulations (e.g., Ozempic), which we refer to as the diabetic cohort, and out-of-pocket alternatives (e.g., Wegovy), which we call the weight-management cohort. In the diabetic cohort, we restrict attention to individuals who receive semaglutides within six quarters of their first insulin prescription, so that comparisons are made among patients at a broadly similar stage of diabetes treatment and for the weight-management cohort, we restrict to non-diabetics with a prior overweight or obesity diagnosis ($BMI \geq 25$). Identification is then achieved by comparing earlier semaglutide adopters to later initiators who have not yet entered treatment. Section 3.1 details this staggered difference-in-differences design, for the two samples.

We then assess the robustness of the main findings using three complementary exercises for

the diabetic cohort and two for the weight-management cohort. First, for both samples, we compare semaglutide initiators who remain on treatment to those who interrupt treatment shortly after initiation, exploiting variation in sustained exposure among individuals who cross the same initial take-up margin. Second, for the diabetic cohort only, we compare individuals whose first relevant diabetes treatment is a semaglutide to individuals whose first relevant diabetes treatment is insulin, thereby using an alternative clinical-treatment path as the comparison group. Third, we implement a matched version of the semaglutide-versus-insulin comparison for the diabetic sample; for the weight management sample, we match treated individuals to the population with an overweight or obesity diagnosis who are not receiving Wegovy. For both matched samples, we use propensity-score matching within cohorts to improve balance on observed pre-treatment characteristics. These exercises, described in more detail in Section 3.2, examine whether the estimated labor-market response is robust to alternative comparison groups, sample definitions, and treatment margins.

3.1. Main Design: Timing of Ozempic Initiation among Eventual Users

Our preferred empirical design exploits variation in the timing of semaglutide initiation among individuals who eventually initiate treatment. Let T_i denote the quarter of individual i 's first semaglutide prescription. Treatment cohorts are defined by T_i , and identification comes from comparing individuals who initiate semaglutides earlier to individuals who initiate semaglutides later but have not yet started treatment at the relevant calendar date. Here we focus first on semaglutide prescriptions that are reimbursed (e.g., Ozempic) - this is our diabetic cohort.¹ To ensure comparisons are made among patients at an equivalent stage of diabetes progression, our sample is restricted to individuals who initiate semaglutide therapy within six quarters of their first insulin prescription. Second, we look at those in the pay-out-of-pocket sample (e.g. Wegovy). This allows us to compare the diabetic cohort to the weight-management cohort directly.

We estimate dynamic treatment effects using the staggered difference-in-differences framework of (Callaway and Sant'Anna, 2021). For each treatment cohort, the comparison group consists of later semaglutide initiators who are untreated at the time they serve as controls. The estimand is therefore the effect of earlier semaglutide initiation relative to delayed initiation among eventual users, rather than the effect of semaglutides relative to never using the drug; this comparison is useful because it holds fixed eventual take-up and therefore reduces concerns that permanent

¹Reimbursed semaglutide formulations in Denmark include both injectable Ozempic and the oral variant Rybelsus (see Table A1). Because Ozempic overwhelmingly dominates the market share within this category, we refer to this entire reimbursed sample as Ozempic for expositional simplicity.

differences between users and non-users drive the estimated labor-market response. We report dynamic effects over an event-window available for each cohort and specification, omitting $\tau = -1$. For comparability with the other empirical strategies, the corresponding event-study representation is:

$$y_{it} = \sum_{\tau=-6, \tau \neq -1}^8 \gamma_{\tau} [\text{semaglutide}_{i\tau}] + \mu_{\tau} + \nu_t + \eta_i + \varepsilon_{it} \quad (1)$$

Here, y_{it} denotes the labor-market outcome of individual i in quarter t . The main outcomes are employment, total hours worked, and total labor earnings. Employment is an indicator equal to one if the individual is employed in the quarter. Hours are measured at the quarterly level. Labor earnings are measured unconditionally, so earnings are set to zero for individuals who are not employed. This outcome definition allows the earnings measure to capture changes along both the extensive and intensive margins of labor supply.

The variable $\text{semaglutide}_{i\tau}$ indicates that individual i is at event time $\tau = t - T_i$ relative to first prescription. For the diabetic cohort this would measure the first prescription of reimbursable semaglutides such as Ozempic, and in the weight loss cohort, this would measure the first recorded use of self-paid semaglutides such as Wegovy. In the event-study representation, the specification includes event-time indicators μ_{τ} , calendar year-quarter fixed effects, ν_t , and individual fixed effects, η_i . Calendar year-quarter fixed effects absorb aggregate shocks, seasonality, and secular changes in labor-market conditions or prescribing patterns. Individual fixed effects absorb all time-invariant differences across individuals, including baseline labor-market attachment, stable health differences, education, and other fixed characteristics that may affect both treatment timing and labor-market outcomes.

The reported dynamic effects are obtained by comparing each treatment cohort to later-treated individuals who have not yet initiated semaglutides at the relevant calendar date and then aggregating the resulting group-time treatment effects by event time. Identification therefore comes from differential changes in outcomes around semaglutide initiation, using not-yet-treated eventual initiators as the counterfactual path for earlier initiators. Standard errors are clustered at the individual level to allow for arbitrary serial correlation in outcomes within individuals over time.

The identifying assumption is that, within this restricted sample, the timing of semaglutide initiation is unrelated to differential counterfactual changes in labor-market outcomes. Under this assumption, later initiators provide the counterfactual path for earlier initiators before they themselves start semaglutides.

We note an important institutional nuance regarding our primary diabetic sample conditioning.

By restricting our baseline cohort to individuals initiating semaglutide within six quarters of their first insulin prescription, our main design intentionally focuses on a subpopulation of patients facing advanced or tightly managed diabetes progression. While this restriction successfully narrows the unobserved health-severity gap between early and late adopters required to claim causality, clinical guidelines during our sample period increasingly favored prescribing GLP-1 formulations as early-stage interventions prior to insulin initiation. To ensure that our estimated causal effects are not uniquely driven by selection into this advanced-severity cohort, we explicitly loosen and test this initial condition across our robustness suite. Specifically, in an alternative design (Robustness 2), we examine patients initiating semaglutide as their primary line of care without prior insulin history, and in our propensity-score-matched framework (Robustness 3), we non-parametrically balance treated units across comprehensive pre-treatment disease-duration tracks. We find that while shifting clinical guidelines alter the baseline severity of the treated population, the underlying labor supply effects remain remarkably stable.

3.2. *Robustness*

One potential concern with the staggered DID approach is that there are systematic differences between early and late adopters, that may make them unsuitable as comparison groups. For this reason, we engage in three additional empirical exercises in order to confirm the robustness of our findings. The first robustness test uses an alternative treatment vs control group, while the other two robustness tests focus on the same sample but using alternative approaches to ensuring comparability.

3.2.1. *Robustness 1: Continuous versus interrupted Ozempic use*

Our first robustness check exploits variation in treatment persistence among individuals who initiate semaglutides. The goal is to estimate the labor-market effect of remaining on semaglutides relative to interrupting treatment shortly after initiation. This strategy is complementary to the semaglutide-versus-insulin design discussed below: while that methodology compares alternative initial diabetes-treatment paths, this strategy compares different persistence paths among semaglutide initiators. We implement this empirical strategy for both of our samples of interest, generating separate estimates for the diabetic cohort and the weight-management cohort.

For the diabetic cohort, the analysis sample consists of individuals who receive a reimbursed semaglutide prescription (Ozempic) for the first time between 2018 and 2022 and are observed for 13 quarters. For the weight-management cohort, which only became available in Denmark in 2023, the sample consists of individuals who receive a Wegovy prescription for the first time in 2023 and are observed for 9 quarters. In both cohorts, we exclude individuals with serious

health problems, as described below. The event date T_i is the quarter of the first semaglutide prescription. We classify individuals according to their prescription trajectory after T_i : *stayers* are individuals who remain on semaglutide beyond the initial three-quarter window, while *leavers* are individuals who discontinue semaglutides within that window and who are at most on semaglutides for two quarters. The estimates should therefore be interpreted as the intention-to-treat effect of entering a continuous-use path rather than an interrupted-use path among individuals who initiate semaglutides.

The identification strategy relies on the idea that, among individuals who start semaglutides, early discontinuation is partly driven by idiosyncratic tolerance to the medication. Semaglutides are known to generate side effects in approximately one in ten users, and early discontinuation may therefore reflect intolerance rather than differences in the potential labor-market returns to treatment (see *Safety profiles for once-weekly Ozempic (semaglutide)* (n.d.)). By comparing individuals who receive a similar initial prescription but subsequently follow different treatment paths, the design exploits variation in sustained exposure to semaglutides among patients who have crossed the same initial take-up margin. We exclude people with a positive Charlson Comorbidity Index any time in the sample, where the Charlson index excludes diabetics. This is to avoid time-varying confounding factors, such as serious health problems that may affect both semaglutide retention and labor market outcomes.

We estimate the following event-study specification:

$$y_{it} = \sum_{\tau=-6, \tau \neq -1}^8 \gamma_{\tau} [Stayer_i \times \mathbf{1}\{t - T_i = \tau\}] + \mu_{\tau} + \nu_t + \eta_i + \varepsilon_{it}. \quad (2)$$

$Stayer_i$ is an indicator equal to one for individuals who continue semaglutides beyond the initial persistence window and equal to zero for individuals who discontinue within that window. The coefficients γ_{τ} trace the evolution of outcomes for stayers relative to leavers at event time τ , normalized to the quarter immediately before the first semaglutide prescription, $\tau = -1$. The event window runs from six quarters before the first semaglutide prescription to eight quarters after the first prescription. Because stayer status is defined using prescription behavior after initiation, coefficients during the initial persistence window are part of the classification period. The main coefficients of interest are those after stayers and leavers have separated into continuous and interrupted treatment paths.

The specification includes event-time fixed effects, μ_{τ} , calendar year-quarter fixed effects, ν_t , and individual fixed effects, η_i . Standard errors are clustered at the individual level.

The identifying assumption is that, conditional on initiating semaglutides, calendar time, event

time, and individual characteristics, the factors driving early discontinuation are unrelated to the potential labor-market gains from sustained semaglutide use. Equivalently, absent continued semaglutide use, stayers would have followed the same labor-market trajectory as leavers. By comparing individuals with similar initial characteristics who begin the medication in comparable periods, the design aims to minimize initial differences in observed and unobserved health severity that could otherwise confound the treatment effect.

3.2.2. Robustness 2: First prescription - Insulin vs. Ozempic

Our second robustness test estimates the labor-market effects of initiating semaglutides relative to initiating insulin among individuals diagnosed with type 2 diabetes. This design focuses on a clinically relevant treatment margin: both groups consist of diabetic patients who begin a new diabetes medication, but the two medications differ in their expected effects on weight and broader cardiometabolic health. Insulin is a standard treatment for glycemic control. Semaglutides improve glycemic control while also reducing appetite and body weight. The comparison therefore estimates the effect of starting a diabetes treatment with weight-loss and appetite-suppression effects relative to starting insulin, rather than the effect of treatment relative to no treatment. Here we focus only on the diabetic cohort.

The sample consists of individuals aged 23 to 65 diagnosed with type 2 diabetes between 2016 and 2022 and observed around the start of treatment. The treated group consists of individuals who receive semaglutides for the first time and have no previous insulin prescription. The comparison group consists of individuals who receive insulin for the first time with no prior insulin or semaglutide prescriptions.

The event date is the quarter of the first semaglutide prescription for treated individuals and the quarter of the first insulin prescription for control individuals. Treatment status is assigned according to this first observed treatment path. Individuals who initially start semaglutides and later receive insulin remain assigned to the semaglutide group. The resulting estimand is therefore an intention-to-treat effect of starting semaglutides rather than insulin. This assignment rule avoids conditioning on subsequent treatment decisions that may themselves be affected by the initial medication choice.

We estimate a difference-in-differences event-study specification of the following form:

$$y_{it} = \sum_{\tau=-6, \tau \neq -1}^8 \gamma_{\tau} [Ozempic_i \times \mathbf{1}\{t - T_i = \tau\}] + \mu_{\tau} + \nu_t + \eta_i + \varepsilon_{it}. \quad (3)$$

T_i denotes the quarter of first semaglutide or insulin prescription. $Ozempic_i$ is an indicator equal

to one for individuals whose first relevant treatment is semaglutide and equal to zero for individuals whose first relevant treatment is insulin. The coefficients γ_τ trace the evolution of outcomes for semaglutide initiators relative to insulin initiators at event time τ , normalized to the quarter immediately before treatment initiation, $\tau = -1$. The event window runs from six quarters before treatment initiation to eight quarters after treatment initiation.

The specification includes event-time fixed effects, μ_τ , calendar year-quarter fixed effects, ν_t , and individual fixed effects, η_i . Standard errors are clustered at the individual level.

The identifying assumption is that, conditional on diabetes diagnosis, calendar time, event time, and individual characteristics, the initial choice between semaglutides and insulin is unrelated to differential counterfactual changes in labor-market outcomes. In other words, insulin initiators provide a valid comparison group for how the employment and earnings of semaglutide initiators would have evolved had they instead started insulin. The assumption allows semaglutide and insulin initiators to differ in baseline health and labor-market attachment, but requires that these differences would not have generated different changes in outcomes around treatment initiation absent semaglutides. We evaluate the plausibility of this assumption by examining whether the two groups exhibit similar pre-treatment dynamics in the event-study coefficients.

3.2.3. Robustness 3: Propensity Score Matching

A remaining concern of the previous two methodologies is that the two groups may differ systematically before treatment. For example, individuals who initiate semaglutides rather than insulin may differ in age, gender, education, baseline labor-market attachment, or health severity, and these characteristics may also predict subsequent employment and earnings trajectories.

We address this concern by implementing a matched version of the semaglutides-versus-insulin design. Within cohort, we estimate each individual's propensity to initiate semaglutides using observed pre-treatment characteristics and match treated individuals to comparable controls, ensuring that individuals in both groups are diagnosed with Type 2 diabetes at the same time. We then estimate a stacked difference-in-differences event-study on the matched sample. This approach preserves the clinical comparison between semaglutide and insulin initiators while improving balance on observables and ensuring that treated and comparison individuals are observed at comparable points in calendar time and disease progression.

For the matching procedure, we estimate the propensity to initiate semaglutides within cohort using pre-treatment characteristics, including age, gender, and education, and then match flexibly on pre-initiation labor market characteristics to account for labor market trends prior to take-up. Most importantly, we match on the quarter of the diagnosis of Type 2 diabetes to ensure that the individuals in both groups are at the same stage of their diabetes diagnosis. In the baseline matched

specification, each semaglutide initiator is matched to three comparison individuals using nearest-neighbour matching, and observations outside the region of common support are excluded.

For our weight management sample we implement a similar matching procedure. We match out-of-pocket semaglutide users to the general population, ensuring that individuals are matched on the same set of pre-treatment characteristics mentioned above, with the addition of the BMI as an extra match variable. This restricts our sample to those with BMI measures in the data. As with the previous sample, we also match on pre-initiation labor market characteristics, using a 3:1 nearest neighbour matching method, ensuring those observations outside the common support are dropped.

For both samples, we estimate the dynamic treatment effects in the matched sample using a stacked difference-in-differences event-study specification:

$$y_{ict} = \sum_{k=-4, k \neq -1}^8 \delta_k (Ozempic_{ic} \times \mathbf{1}\{t - T_{ic} = k\}) + \alpha_{ic} + \lambda_{ct} + \varepsilon_{ict}. \quad (4)$$

Here, y_{ict} denotes the labor-market outcome of individual i in cohort c and calendar quarter t . The variable $Ozempic_{ic}$ is equal to one for treated individuals and zero for matched comparison individuals. T_{ic} denotes the event quarter assigned within the cohort: the first semaglutide prescription for treated individuals and the matched event quarter for comparison individuals. The omitted event time is $k = -1$, the quarter immediately before treatment initiation.

The coefficients δ_k trace the dynamic effect of semaglutide initiation relative to the matched comparison group. Individual-by-cohort fixed effects, α_{ic} , absorb time-invariant differences between treated and matched comparison individuals, while cohort by year-quarter fixed effects, λ_{ct} , absorb aggregate shocks and secular changes common to all individuals. Standard errors are clustered at the individual level.

The identifying assumption is that, after matching and conditional on fixed effects, treated and matched comparison individuals would have followed parallel labor-market trajectories absent semaglutide initiation. Pre-treatment coefficients provide a diagnostic check of this assumption. Because matching only addresses selection on observed characteristics, we interpret this specification as a robustness check rather than as the primary empirical design.

3.3. Estimation Samples and Outcomes

All empirical analyses use Danish administrative registry data organized as a quarterly individual-level panel. The outcomes are measured at the quarterly level and include employment, total hours worked, hours conditional on employment, labor earnings, labor earnings conditional on employ-

Table 1: Summary Statistics, Ozempic (Diabetic Cohort)

Variable	Main strategy Staggered DiD	Robustness 1 Dropout sample		Robustness 2 Insulin sample		Robustness 3 PSM sample		Staggered DiD Subsamples	
	All (1)	Control (2)	Treatment (3)	Control (4)	Treatment (5)	Control (6)	Treatment (7)	BMI (8)	No BMI (9)
Number of people	2,424	4,732	44,056	5,884	3,140	2,095	1,082	271	2,123
Employment	0.62	0.66	0.70	0.55	0.55	0.88	0.81	0.45	0.64
Quarterly hours worked	248.35 (228.91)	271.21 (227.01)	290.90 (224.71)	220.58 (226.69)	211.98 (225.71)	352.69 (188.27)	330.06 (206.77)	161.72 (215.11)	260.01 (228.14)
Quarterly hours worked (conditional)	402.96 (156.81)	410.02 (144.86)	414.81 (143.53)	402.05 (150.57)	389.43 (164.16)	404.23 (148.53)	410.24 (146.04)	356.34 (180.31)	407.07 (153.87)
Quarterly earnings (1,000 DKK)	59.96 (62.92)	68.78 (70.14)	74.53 (70.75)	50.24 (59.34)	50.76 (61.28)	80.81 (56.36)	81.76 (61.80)	37.14 (52.63)	63.19 (63.69)
Quarterly earnings (1,000 DKK, conditional)	97.95 (61.19)	103.98 (61.46)	106.28 (61.34)	94.25 (105.64)	93.75 (60.62)	97.84 (133.27)	102.90 (59.94)	81.84 (49.42)	99.66 (62.13)
Hourly wage (DKK)	235.95 (91.59)	249.02 (113.23)	250.46 (111.75)	225.33 (97.01)	231.92 (95.80)	227.56 (98.00)	246.24 (98.03)	224.89 (86.65)	237.54 (92.20)
Age	50.50 (8.85)	48.75 (9.97)	50.88 (8.80)	50.42 (9.69)	50.73 (9.38)	48.18 (11.70)	51.07 (9.50)	50.31 (8.33)	50.68 (8.85)
Calendar year	2021 (1.20)	2021 (1.17)	2021 (1.33)	2018 (2.37)	2020 (1.20)	2018 (2.44)	2021 (1.52)	2021 (1.19)	2021 (1.20)
Years of education	12.19 (2.34)	12.64 (2.61)	12.59 (2.47)	12.11 (2.52)	11.97 (2.42)	12.96 (2.49)	12.67 (2.30)	11.59 (2.35)	12.25 (2.33)
Female	0.42	0.56	0.52	0.33	0.40	0.33	0.33	0.63	0.39
Immigrant	0.12	0.19	0.13	0.21	0.14	0.16	0.09	0.13	0.12
Married	0.47	0.50	0.54	0.46	0.44	0.52	0.53	0.43	0.47

Notes: The table reports summary statistics for the samples used in the different estimation strategies. Unless otherwise noted, covariates are measured in the quarter immediately preceding the individual's first observed semaglutide prescription. For the insulin sample, covariates are measured in the quarter immediately preceding the first diabetes diagnosis. Employment, hours worked, earnings, and hourly wages are measured at the quarterly level. Earnings are reported in thousands of Danish kroner (DKK), and hourly wages in DKK; both are expressed in 2024 prices. Earnings, hours worked, and hourly wages are winsorized at the 99th percentile. Standard deviations are reported in parentheses below the means. DiD denotes difference-in-differences; PSM denotes propensity score matching; BMI denotes body mass index.

ment, and hourly wages. Employment is an indicator for being employed in the quarter. Earnings are measured unconditionally, with earnings set to zero for individuals who are not employed, so that this outcome captures both extensive- and intensive-margin labor-supply responses. Conditional earnings, conditional hours, and hourly wages are defined among individuals who are employed. Earnings and wages are expressed in 2024 Danish kroner and are winsorized at the 99th percentile.

Table 1 and Table 2 report baseline characteristics for the estimation samples used in the main design and robustness exercises for the diabetic and weight-management cohorts, respectively. The samples differ in size because each design uses a distinct source of identifying variation. The main staggered-adoption design is based on 2,424 eventual semaglutide users. The persistence design is the largest comparison, with 4,732 early discontinuers and 44,056 continuous users. The semaglutide-versus-insulin design compares 5,884 insulin initiators to 3,140 semaglutide initiators. The matched design is smaller by construction, retaining 2,095 matched comparison individuals and 1,082 treated individuals after matching and common-support restrictions. These differences matter for precision: the persistence and insulin comparisons have larger comparison groups, while the matched design trades sample size for improved balance on observed characteristics.

The samples differ substantially in baseline labor-market attachment, which reflects the different sample selection logic embedded in the identification design. The main staggered-adoption sample has mean employment of 0.62 and mean quarterly earnings of about DKK 60,000. The persistence sample is more strongly attached to the labor market before treatment: employment is 0.66 among early discontinuers and 0.70 among continuous users, and continuous users also have higher baseline hours and earnings. This baseline difference is consistent with the possibility that individuals who remain on treatment are positively selected in health or labor-market stability. The persistence design is therefore informative about sustained exposure, but its interpretation requires particular attention to pre-treatment dynamics and to the post-initiation classification window.

The semaglutide-versus-insulin comparison involves a weaker labor-market population. Both groups have baseline employment rates of 0.55, and quarterly earnings are around DKK 50,000. This is lower than in the main and persistence samples, consistent with the insulin comparison capturing individuals at a different stage of diabetes treatment or with different underlying disease severity. The similarity in baseline employment between insulin and semaglutide initiators is reassuring for this design, but the comparison remains clinically different from the main staggered-adoption design because it contrasts alternative initial treatment paths rather than earlier versus later semaglutide initiation.

Table 2: Summary Statistics, Wegovy (Weight Management Cohort)

	Main strategy Staggered DiD	Robustness 1 Dropout sample		Robustness 2 PSM sample		Staggered DiD Subsamples	
Variable	All (1)	Control (2)	Treatment (3)	Control (4)	Treatment (5)	BMI < 35 (6)	BMI ≥ 35 (7)
Number of people	2,908	443	4,713	3,682	4,009	1,329	1,579
Employment	0.73	0.68	0.78	0.85	0.86	0.76	0.71
Quarterly hours worked	287.16 (214.70)	269.79 (220.85)	322.12 (209.97)	345.06 (191.05)	345.92 (192.11)	295.08 (209.37)	280.50 (218.93)
Quarterly hours worked (conditional)	394.44 (152.97)	398.83 (143.62)	413.77 (136.78)	407.49 (138.89)	405.44 (146.66)	392.66 (148.70)	396.03 (156.74)
Quarterly earnings (1,000 DKK)	67.22 (56.92)	61.28 (57.05)	77.41 (60.44)	79.72 (52.02)	80.90 (52.71)	68.72 (55.95)	65.97 (57.70)
Quarterly earnings (1,000 DKK, conditional)	93.38 (56.19)	90.59 (46.44)	99.44 (50.03)	95.28 (48.80)	96.09 (51.86)	92.33 (52.30)	94.32 (59.45)
Hourly wage (DKK)	232.08 (76.76)	225.50 (81.36)	237.17 (84.64)	228.59 (97.94)	246.57 (96.28)	233.52 (81.91)	230.80 (71.87)
Age	40.52 (11.17)	37.49 (9.55)	40.64 (9.99)	37.88 (9.71)	41.08 (10.55)	37.93 (10.06)	42.69 (11.60)
Calendar year	2023 (0.45)	2023 (0.75)	2023 (0.74)	2023 (0.46)	2023 (0.47)	2023 (0.43)	2023 (0.46)
Years of education	13.20 (2.33)	12.83 (2.43)	13.36 (2.27)	13.92 (2.26)	13.45 (2.17)	13.50 (2.24)	12.95 (2.38)
Female	0.87	0.91	0.91	0.90	0.88	0.94	0.81
Immigrant	0.10	0.14	0.09	0.09	0.08	0.12	0.08
Married	0.50	0.47	0.55	0.53	0.54	0.49	0.51

Notes: The table reports summary statistics for the samples used in the different estimation strategies. Unless otherwise noted, covariates are measured in the quarter immediately preceding the individual's first observed semaglutide prescription. Employment, hours worked, earnings, and hourly wages are measured at the quarterly level. Earnings are reported in thousands of Danish kroner (DKK), and hourly wages in DKK; both are expressed in 2024 prices. Earnings, hours worked, and hourly wages are winsorized at the 99th percentile. BMI is measured in categories 25, 30, 35, 40, 45, 50, and 55. Standard deviations are reported in parentheses below the means. DiD denotes difference-in-differences; PSM denotes propensity score matching; BMI denotes body mass index.

The matched sample is the most selected in terms of baseline employment: employment is 0.88 among matched controls and 0.81 among treated individuals. Hours and earnings are also substantially higher than in the other samples. This reflects the fact that the matching procedure and common-support restrictions select a subset of individuals with stronger labor-market attachment. The matched design is therefore useful for assessing whether the semaglutide-versus-insulin results are robust to improved balance on observed characteristics, but the resulting estimates should be interpreted as applying to the matched subpopulation rather than to all diabetic treatment initiators.

Baseline demographics further illustrate the different comparisons. The main sample has an average age of about 50.5 and is 42 percent female. In the persistence sample, continuous users are slightly older and more likely to be female than early discontinuers. In the insulin comparison, semaglutide initiators are older and more likely to be female than insulin initiators, which is consistent with non-random treatment selection along observable dimensions. The matched sample improves balance in gender composition, with both groups about one-third female, although treated individuals remain older on average and somewhat less attached to employment than matched controls.

Taken together, Table 1 highlights that the empirical designs estimate related but distinct treatment contrasts. The main staggered-adoption design compares earlier and later semaglutide initiation among eventual users and is therefore the preferred specification for isolating the timing effect of treatment. The persistence design evaluates the importance of sustained exposure among initiators, but is more vulnerable to selection into continuation. The semaglutide-versus-insulin design compares alternative diabetes-treatment paths, while the matched design assesses whether that comparison is robust to balancing observed characteristics. For this reason, the results should be interpreted primarily within each design, using pre-treatment event-study coefficients to assess comparability, rather than by comparing outcome levels across samples.

Table 1 reports the corresponding statistics for the weight-management cohort. Compared with the diabetic cohort, this population is younger (mean age 40.5 versus 50.5), predominantly female (87 percent), better educated, and more strongly attached to the labor market, with baseline employment of 0.73 and mean quarterly earnings of about DKK 67,000 in the main sample. As in the diabetic cohort, continuous users in the dropout sample are more strongly attached to the labor market than early discontinuers (employment of 0.78 versus 0.68), consistent with positive selection into treatment persistence. In the matched sample, treated and comparison individuals are well balanced on employment (0.86 and 0.85), hours, and earnings. Individuals with BMI ≥ 35 are older and less likely to be employed than those with BMI below 35.

To summarize the dynamic estimates, we report the difference between the average coefficient over a cohort-specific post-treatment window and the average coefficient over the four pre-treatment periods.² For the diabetic cohort, this window begins with the sixth post-treatment period and extends through the final period available in each specification. For the weight-management cohort, the window begins with the fourth post-treatment period, reflecting the shorter follow-up available following Wegovy’s later introduction. Within each cohort, the starting period is fixed, while the endpoint and the number of periods included in the average vary across specifications. The reported estimates therefore summarize effects over different available horizons rather than over a common number of post-treatment periods.

4. Results

In this section, we present our dynamic event-study estimates and evaluate how the causal impacts of semaglutide adoption manifest across our two distinct therapeutic tracks. We systematically trace individual behavioral adaptations along both the extensive and intensive margins, detailing the resulting treatment effects on employment probabilities, quarterly hours worked, total labor earnings, and hourly wage rates. Section 4.1 outlines the causal health-remediation margins within the subsidized diabetic cohort (Ozempic), while Section 4.2 characterizes the volume-driven labor supply response within the out-of-pocket weight-management cohort (Wegovy).

4.1. *Effects of Ozempic on the Labor Market: The Diabetic Cohort*

This section presents the estimated causal labor-market impacts of semaglutide initiation within our first primary therapeutic track: the subsidized diabetic cohort. We focus first on the staggered-adoption design among eventual semaglutide users, which is our preferred specification. We then summarize the evidence from the alternative designs, which provide complementary checks based on different comparison groups and sources of variation. Table 1 reports baseline characteristics for the estimation samples, and Table 3 summarizes the estimated effects, averaged from the sixth post-treatment period through the final period available in each specification. The full dynamic event-study estimates are reported in Figure 3 for the main strategy, Appendix Figure B1 for robustness test comparing persistent vs. temporary semaglutide use, Appendix Figure B2 for the second robustness test using insulin versus semaglutides and Appendix Figure B3 for the propensity score matching results.

²For the staggered DiD specifications, we instead average the post-treatment average treatment effects on the treated over the same cohort-specific window.

Table 3: Results Summary, Ozempic (Diabetic Cohort)

	Main strategy Staggered DiD	Robustness 1 Dropout sample	Robustness 2 Insulin sample	Robustness 3 PSM sample	Staggered DiD Subsamples	
Outcome	All (1)	All (2)	All (3)	All (4)	BMI (5)	No BMI (6)
Employment	0.041 ^{***} (0.014)	0.008 [*] (0.004)	0.021 ^{***} (0.008)	0.060 ^{***} (0.020)	0.039 (0.043)	0.041 ^{***} (0.015)
Quarterly hours worked	19.50 ^{***} (5.67)	6.48 ^{***} (1.62)	9.74 ^{***} (3.42)	21.67 ^{**} (8.90)	12.40 (17.00)	25.60 ^{***} (6.08)
Quarterly hours worked (conditional)	13.70 ^{**} (5.65)	6.02 ^{***} (1.92)	6.58 ^{**} (3.33)	12.80 ^{**} (6.10)	-1.87 (22.90)	16.14 ^{***} (5.85)
Quarterly earnings (DKK)	3,407 ^{**} (1,385)	2,702 ^{***} (543)	1,662 ^{**} (819)	5,797 ^{***} (2,252)	-920 (3,607)	4,188 ^{***} (1,513)
Quarterly earnings (DKK, conditional)	3,407 [*] (1,754)	2,596 ^{***} (538)	1,113 (928)	1,121 (2,291)	-3,026 (5,053)	4,203 ^{**} (1,868)
Hourly wage (DKK)	1.080 (2.980)	1.560 (1.030)	-1.280 (1.830)	-0.680 (2.920)	-8.280 (8.220)	1.920 (3.190)
Observations	29,312	612,222	109,269	28,247	3,330	25,624

Notes: The table summarizes average treatment effects on the treated over the available post-treatment periods beginning with the sixth post-treatment period. The final period available, and hence the number of periods included in the average, varies across specifications. Standard errors are reported in parentheses. Employment effects are expressed as changes in the probability of employment. Hours worked and earnings are measured quarterly; hourly wages are measured in DKK per hour. Conditional outcomes are measured among employed individuals. Earnings and hourly wages are expressed in 2024 prices. Earnings, hours worked, and hourly wages are winsorized at the 99th percentile. ^{*} $p < 0.10$, ^{**} $p < 0.05$, ^{***} $p < 0.01$.

The staggered-adoption design shows a gradual and economically meaningful improvement in labor-market outcomes after semaglutide initiation. Employment rises steadily over the post-treatment window, reaching approximately 4 percentage points in the later quarters after initiation. Relative to a baseline employment probability of 62 percent, this corresponds to an increase of roughly 6.6 percent in the probability of being employed. Hours worked also increase, by 19.5 hours per quarter when measured unconditionally and by 13.7 hours per quarter among those working, which gives respectively an 8 and 3.5 percent increase in hours worked. These estimates imply that semaglutide use increases labor supply both by moving individuals into employment and by increasing hours among those already employed.

Labor earnings increase alongside employment and hours. In the preferred specification, quarterly earnings increase by approximately DKK 3,400 both unconditionally and conditional on employment, equivalent to 5.7 percent and 3.5 percent of their respective baseline means. The estimated effect on hourly wages is positive but modest. This pattern indicates that the earnings response is driven primarily by labor-supply adjustments rather than by large changes in hourly pay.

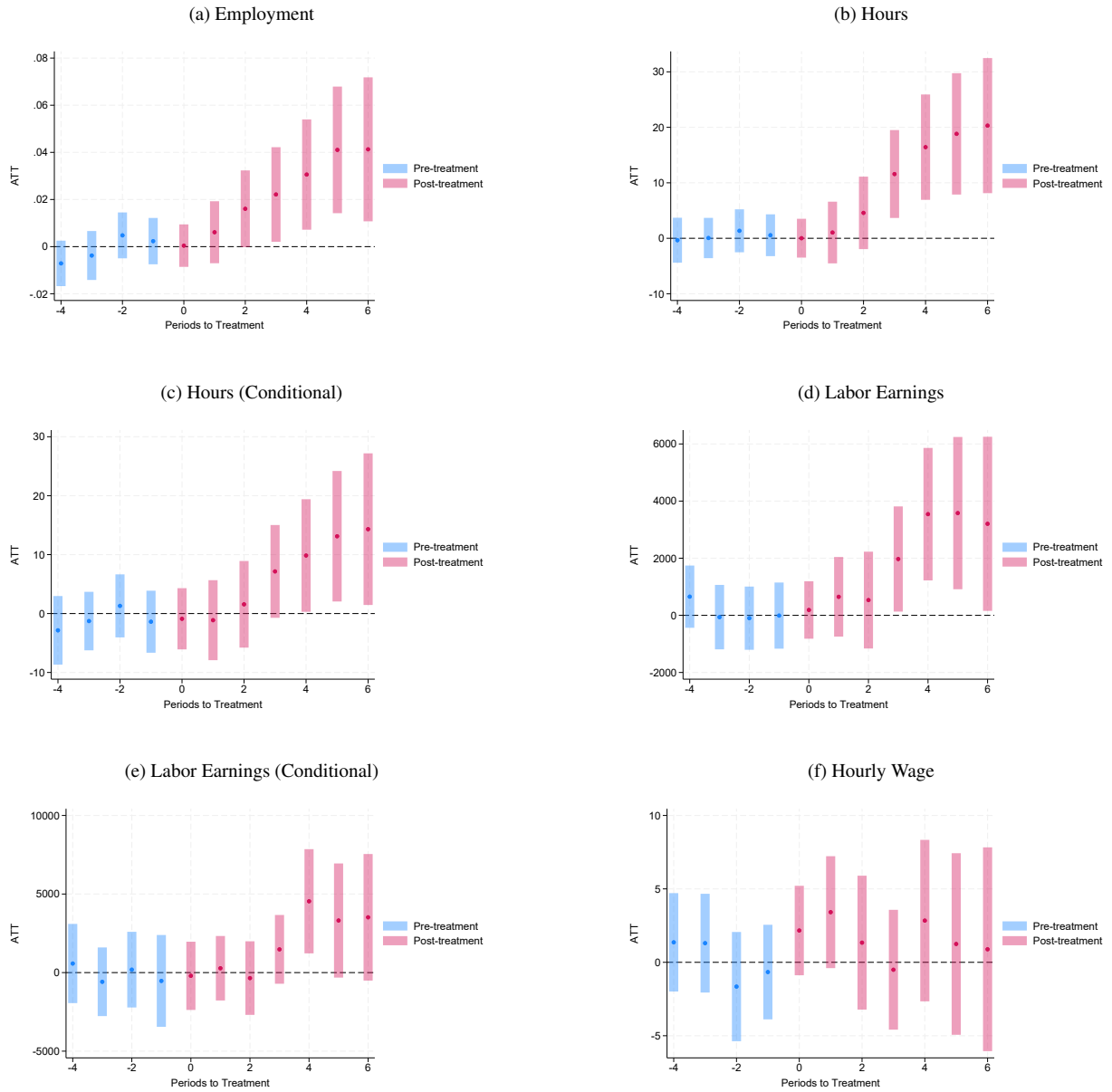
The comparison between continuous and interrupted semaglutide use shows that treatment per-

sistence is associated with stronger labor-market outcomes after the initial persistence window (see Appendix Figure B1). Continuous users experience higher employment, hours, and earnings relative to early discontinuers, with effects that become more pronounced once the two groups have separated into sustained and interrupted treatment paths and become larger over time, consistent with the interpretation that sustained exposure is necessary for the labor-market benefits to materialize. The effects are most precisely estimated for hours worked: employment rises modestly, while total and conditional hours increase more robustly. This suggests that, among individuals who initiate semaglutide, continued use operates primarily through the intensive margin of labor supply. Quarterly earnings increase by about DKK 2,700 in the later post-treatment quarters, with similar gains for conditional earnings (see Table 3). As in the other specifications, wage effects are small relative to the effects on employment and hours.

The semaglutide-versus-insulin comparison provides a complementary test of whether the labor-market response is specific to semaglutide rather than to the initiation of diabetes treatment more generally. Whereas the persistence design compares different exposure paths among individuals who all initiate semaglutide, this specification compares individuals whose first relevant diabetes treatment is semaglutide to individuals whose first relevant treatment is insulin. The estimates point in the same direction as the main staggered-adoption results, but are smaller in magnitude. Semaglutide initiators experience higher employment and hours after treatment initiation: employment rises by about 2 percentage points, while total hours worked increase by roughly 10 hours per quarter and conditional hours by about 7 hours (see Table 3). Quarterly earnings increase by about DKK 1,700, while conditional earnings are positive but less precisely estimated. Hourly wage effects are small and statistically insignificant. This pattern suggests that semaglutide improves labor-market attachment relative to an alternative diabetes-treatment path, although the smaller magnitudes are consistent with the possibility that the unmatched insulin and semaglutide groups differ along observed and unobserved dimensions of disease progression and labor-market attachment.

The propensity-score-matched estimates address this concern by re-estimating the semaglutide-versus-insulin comparison after improving balance on observed pre-treatment characteristics and restricting attention to individuals on common support. In contrast to the unmatched insulin comparison, the matched estimates demonstrate robust effects that reinforce the main staggered-adoption results for the central labor-supply outcomes. Employment increases by 6.0 percentage points, total hours worked rise by 21.67 hours per quarter, and quarterly earnings increase by DKK 5,797. At the same time, the effects on hourly wages remain small and statistically insignificant, confirming that in the matched sample the gains continue to operate mainly through expanded

Figure 3: Dynamic Treatment Effects, Ozempic (Diabetic Cohort): Staggered DID



Notes: The figure reports dynamic average treatment effects from the main staggered adoption design: Staggered DID (Callaway and Sant'Anna, 2021). Treatment is defined by the quarter of first Ozempic prescription. The comparison group consists of later Ozempic initiators who have not yet initiated treatment at the relevant event time. The omitted event time is the quarter immediately before initiation. Employment is measured as an indicator for being employed in the quarter. Hours, earnings, and wages are measured at the quarterly level; conditional outcomes restrict the outcome definition to individuals who are working.

labor volume and extensive margin attachments rather than shifts in hourly pay rates. Overall, the matched results strengthen the core conclusions of the paper and suggest that the more attenuated

Table 4: Results Summary, Wegovy (Weight Management Cohort)

	Main strategy Staggered DiD	Robustness 1 Dropout sample	Robustness 2 PSM sample	Staggered DiD Subsamples	
Outcome	All (1)	All (2)	All (3)	BMI < 35 (4)	BMI ≥ 35 (5)
Employment	−0.004 (0.019)	0.035** (0.016)	0.020*** (0.007)	0.001 (0.031)	0.001 (0.025)
Quarterly hours worked	25.30*** (9.15)	10.90 (7.52)	17.30*** (3.19)	27.50* (14.20)	28.80** (11.70)
Quarterly hours worked (conditional)	29.70*** (9.70)	−1.47 (6.49)	13.40*** (2.39)	35.70** (14.90)	25.40** (12.30)
Quarterly earnings (DKK)	6,508*** (2,086)	4,240** (1,791)	3,961*** (732)	5,974* (3,159)	8,409*** (2,759)
Quarterly earnings (DKK, conditional)	7,589*** (2,320)	821 (1,548)	2,464*** (807)	5,662 (3,622)	9,811*** (2,921)
Hourly wage (DKK)	3.130 (3.760)	1.470 (2.610)	−0.760 (0.910)	−7.320 (5.600)	12.800** (5.020)
Observations	29,303	46,157	69,211	13,282	16,021

Notes: The table summarizes average treatment effects on the treated over the available post-treatment periods beginning with the fourth post-treatment period. This earlier starting point relative to Diabetic cohort reflects the shorter follow-up available following Wegovy's later introduction. The final period available, and hence the number of periods included in the average, varies across specifications. Standard errors are reported in parentheses. Employment effects are expressed as changes in the probability of employment. Hours worked and earnings are measured quarterly; hourly wages are measured in DKK per hour. Conditional outcomes are measured among employed individuals. Earnings and hourly wages are expressed in 2024 prices. Earnings, hours worked, and hourly wages are winsorized at the 99th percentile. BMI is measured in categories 25, 30, 35, 40, 45, 50, and 55. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

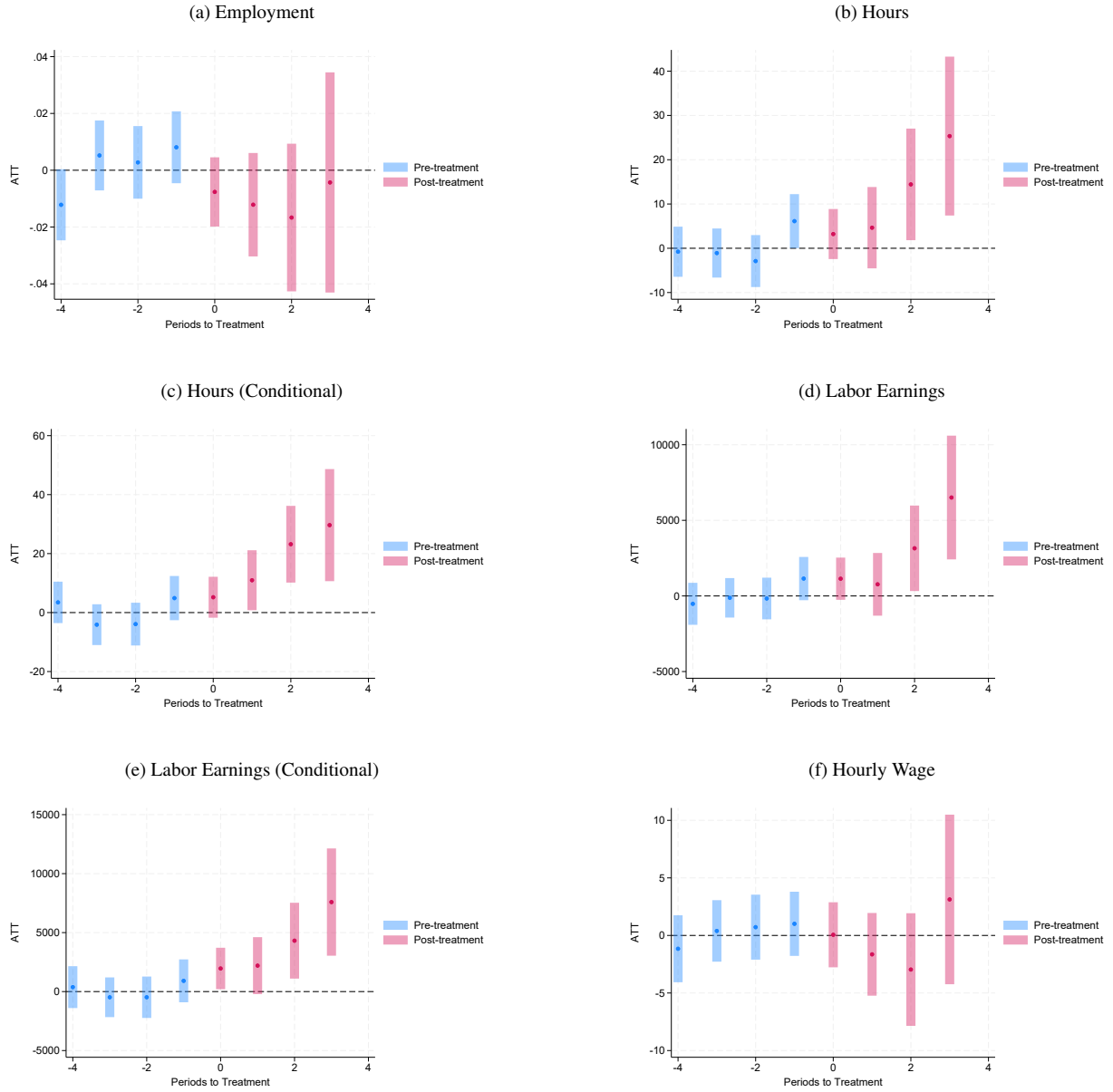
estimates in the unmatched insulin comparison partly reflect compositional differences between the initial treatment groups.

Taken together, the results indicate that semaglutide use improves labor-market outcomes primarily by increasing labor supply. Across the four designs, we find consistent evidence of increased probability of employment and hours worked. Wage effects are weaker and less consistent.

4.2. Effects of Wegovy on the Labor Market: The Weight-Management Cohort

We next examine whether the causal labor-market effects of metabolic care extend beyond the subsidized diabetes setting by applying our preferred staggered-adoption design to our second major therapeutic track: the out-of-pocket weight-management cohort. This comparison is conceptually distinct from the analysis of the diabetic cohort utilizing Ozempic. Whereas the Ozempic estimates are identified among diabetic patients receiving general subsidies, the Wegovy sample consists of non-diabetic individuals with a prior clinical overweight or obesity diagnosis ($\text{BMI} \geq 25$) who initiate therapy entirely out-of-pocket. The resulting estimates therefore speak directly to the labor-market returns to semaglutide in a population for whom treatment is explicitly tied to weight management rather than glycemic control.

Figure 4: Dynamic Treatment Effects, Wegovy (Weight-Management Cohort): Staggered DID



Notes: The figure reports dynamic average treatment effects from the staggered-adoption design applied to the Wegovy sample. Treatment is defined by the quarter of first Wegovy prescription, and the comparison group consists of later Wegovy initiators who have not yet initiated treatment at the relevant event time. The sample is restricted to individuals with a prior clinical diagnosis of overweight or obesity, defined as BMI ≥ 25 . The omitted event time is the quarter immediately before initiation. Employment is an indicator for being employed in the quarter. Hours, earnings, and wages are measured at the quarterly level; conditional outcomes are restricted to individuals who are employed. Standard errors are clustered at the individual level.

Figure 4 shows that the dynamic event-study estimates for the weight-management cohort are strongly consistent with a labor-supply capacity interpretation, though the behavioral adjustments operate on entirely different margins than the diabetic group. Table 4 summarizes the estimated effects, averaged from the fourth post-treatment period through the final period available in each specification. These patterns remain highly robust across the alternative estimation designs summarized in Table 4. On the extensive margin, we find no evidence of an employment response: the estimated employment coefficient is a precisely estimated near-zero (-0.004 , $SE = 0.019$) that remains statistically flat throughout the post-treatment horizon.

In sharp contrast, labor supply expands robustly on the intensive margin following Wegovy initiation. As reported in Column 1 of Table 4, unconditional total hours worked increase by 25.3 hours per quarter ($SE = 9.15$), an effect that is highly statistically significant ($p < 0.01$). This labor volume expansion becomes even more pronounced when conditioning on active workforce attachment, with conditional intensive labor supply expanding by 29.7 hours per quarter ($SE = 9.70$). This concentration of capacity gains among individuals who are already employed confirms that the transmission channel operates by scaling up the intensive baseline weekly hours of existing workers rather than by stimulating extensive-margin transitions into the workforce.

Labor earnings tracks follow an identical structural trajectory. Driven entirely by the intensive hour expansions, quarterly labor earnings expand unconditionally by DKK 6,508 ($p < 0.01$) toward the end of the post-treatment window. When restricting the estimation to active workers, conditional quarterly earnings grow by a substantial DKK 7,589 ($SE = 2,320$). Conversely, the estimated impacts on hourly wage rates remain small at DKK 3.13 per hour and are statistically insignificant ($SE = 3.76$). Taken together, these behavioral parameters confirm that the economic dividend of weight-management pharmacotherapy operates as a pure quantity-driven expansion in physical labor capacity rather than a shift in marginal wage pricing or workplace productivity premium adjustments.

This operational divergence between the two core therapeutic tracks provides a valuable institutional lesson for social insurance frameworks. In the diabetic sample, metabolic care raises both employment entries and intensive hours, reflecting a low-attachment workforce experiencing a generalized restoration of baseline somatic health. In the weight-management sample, the baseline workforce attachment is substantially higher to begin with, at 73% compared to 62% in the Ozempic sample (see Table 2). Because these out-of-pocket workers enter therapy with a high degree of pre-existing labor market sorting, the scope for extensive-margin employment entry is naturally limited. The microdata therefore reveal a unified somatic human capital channel underlying the semaglutide molecule, but one whose active economic margin depends fundamentally

on the baseline workforce attachment and institutional constraints of the targeted population.

5. Public Finance Implications and Cross-Cohort Fiscal Multipliers

To evaluate how the micro-elasticities documented in Section 4 translate into fiscal aggregates, we construct a stylized net public finance accounting impact framework. This framework balances the direct outlays of the tax-financed Danish medicine subsidy system against the implicit income tax dividends generated by the documented labor supply expansions. We use the average quarterly earnings effects reported in Tables 3 and 4, annualize them by multiplying by four, and apply a baseline marginal tax rate of 45%. These calculations represent annualized effects at the observed post-treatment horizons, rather than cumulative earnings gains during the first year after initiation. The cohort-specific calculations are as follows:

- *Subsidized Diabetic Cohort (Ozempic)*: The average quarterly earnings expansion of DKK 3,407 maps to an annualized increase of DKK 13,628. At a 45% tax rate, each treated user generates a public revenue dividend of DKK 6,132.60 per year.
- *Out-of-Pocket Weight Management Cohort (Wegovy)*: The average conditional quarterly earnings increase of DKK 7,589 implies an annualized worker earnings injection of DKK 30,356. A result that strictly emerges through the elasticity of the intensive-margin of the labor supply. At a 45% tax rate, this yields an annual income tax windfall of DKK 13,660.20 per worker, achieved at zero direct subsidy cost to the state.

5.1. Shifting Policy Regimes and Break-even Thresholds

As detailed in the institutional background in Section 2.2.2, the aggregate reimbursement footprint of semaglutides in Denmark escalated rapidly, peaking in 2023 at DKK 1.3 billion across approximately 92,000 distinct Ozempic users (Konkurrence- og Forbrugerstyrelsen, 2024). This historical peak maps to a baseline public subsidy cost of DKK 14,130 per patient per year. However, as documented in Section 2.2.2, subsequent structural policy interventions—specifically the manufacturer price cuts, the tightening of reference pricing caps, and stricter step-therapy clauses enacted by the regional authorities—bent the expenditure curve sharply downward, compressing realized total outlays to DKK 800 million in 2024 (Medicinsk Tidsskrift, 2025b). Assuming stable cohort utilization, this cost compression effectively reduced the per-patient annualized public subsidy outlay to DKK 8,695.³

³In Appendix Appendix C, we provide the full derivations of this public finance accounting framework.

Table 5: Public Finance Framework Under Shifting Pricing Regimes: Cross-Cohort Fiscal Balance

Policy regime	Subsidy outlay (DKK per patient)	User ratio					Breakeven ratio
		0.00	0.25	0.50	0.75	1.00	
2023 baseline	14,130	−8.00	−4.58	−1.17	+2.25	+5.66	0.59
2024 price cut	8,695	−2.56	+0.85	+4.27	+7.68	+11.10	0.19
Curative breakeven	6,133	+0.00	+3.42	+6.83	+10.25	+13.66	0.00

Notes: Net fiscal balances are reported in DKK millions per 1,000 Ozempic users and equal new income tax revenues minus public subsidy outlays. Subsidy outlays are reported in DKK per patient. The user ratio is the number of cash-pay weight management workers relative to subsidized diabetic patients. A ratio of 0.50 corresponds to 500 cash-pay weight management workers per 1,000 subsidized diabetic patients. A ratio of 0.00 represents pure Ozempic use; a ratio of 1.00 represents equal numbers of the two user groups. The breakeven ratio is the user ratio at which the net fiscal balance is zero. Positive values indicate a fiscal surplus; negative values indicate a fiscal deficit.

Table 5 models the net aggregate public budget balance (expressed in Millions of DKK per 1,000 Ozempic users) across these shifting pricing regimes. The matrix tracks how the fiscal balance fluctuates relative to the structural volume ratio of out-of-pocket Wegovy adopters to subsidized Ozempic users in the economy.

The empirical simulation uncovers a significant structural threshold adjustment. Under the 2023 peak price regime, the state faced an isolated fiscal deficit of DKK 8.00 Million per 1,000 diabetic users, requiring a secondary out-of-pocket weight-management cohort ratio of 0.59 to clear the fiscal balance. Under the compressed 2024 price drop parameters induced by the tighter step-therapy guidelines, the standalone diabetic track deficit shrinks dramatically to DKK 2.56 Million. Consequently, the cross-cohort breakeven boundary plunges to a user ratio of just 0.19—meaning that for every 1,000 subsidized diabetic patients, the presence of a mere 190 out-of-pocket weight managers completely offsets the regional health coverage burden via active tax generation.

5.2. Policy Conclusion: The Wisdom of Non-Reimbursement

These results provide a compelling economic justification for the Danish Medicines Agency’s controversial decision, detailed in Section 2.2, to maintain a strict non-reimbursed status for obesity formulations (Allen, 2024b). From a classical social insurance standpoint, a medical therapy that delivers significant, proven labor supply enhancements represents a strong candidate for public coverage. However, our empirical parameters show that the out-of-pocket weight-management cohort acts as a crucial fiscal anchor for the entire metabolic health budget. Because Wegovy users bear the full financial burden of the medication, they face zero public subsidy distortion while simultaneously generating massive, pure-revenue income tax windfalls through intensive hourly expansions (+29.7 conditional hours).

Extending broad public subsidies to the obesity indication would convert this high-performing cash-pay population into a massive public fiscal obligation, threatening to exhaust regional drug budgets. Maintaining the current institutional boundary effectively leverages the high willingness-to-pay of private lifestyle cohorts to fund the tax baseline necessary to sustain subsidized coverage for clinically vulnerable diabetic populations, achieving a self-balancing public finance equilibrium.

6. Conclusion

This paper provides the first comparative empirical evaluation tracking how the introduction of semaglutides affects individual labor market attachments across separate therapeutic tracks: a subsidized diabetic cohort (Ozempic) subject to public reimbursement, and a weight-management cohort (Wegovy) paying entirely out-of-pocket. Leveraging high-quality, linked population-wide administrative microdata from Denmark, our quasi-experimental designs document robust, economically significant labor supply and labor earnings responses following semaglutide initiation.

Our analysis shows that the labor-market effects of GLP-1 treatment differ across populations with different baseline workforce attachment and treatment financing arrangements. For cohorts utilizing subsidized diabetes formulations (Ozempic), the somatic benefits of metabolic care trigger improvements along both the extensive and intensive margins, raising employment probabilities by 4.1 percentage points and conditional labor supply by 13.7 hours per quarter. In stark contrast, among weight-management cohorts paying entirely out-of-pocket (Wegovy), extensive margin entry is statistically flat, but intensive labor capacity expands sharply by 29.7 conditional hours per quarter, generating an annualized earnings injection of over DKK 30,000 per worker. Across all specifications, hourly wage rates remain unaltered, confirming that the microeconomic dividend of these pharmaceutical innovations operates as a quantity-driven expansion in physical labor capacity rather than shifts in marginal wage pricing.

These reduced-form micro-elasticities offer immediate parameters for the design of optimal public health coverage policies. Our back-of-the-envelope accounting simulation shows that while the subsidized diabetic track does not immediately self-fund through short-run labor taxes alone, the unsubsidized weight-management cohort serves as a vital fiscal anchor for government budget clearing. By paying full cash prices, out-of-pocket workers generate substantial, pure income tax revenue windfalls that effectively offset the regional health expenditure burden. This empirical relationship provides a clear justification for the policy choice to withhold public reimbursement for the obesity indication, demonstrating how maintaining a bifurcated institutional boundary—a subsidized diabetic track and an unsubsidized weight-management track—can naturally stabilize a

single-payer healthcare system under severe budget constraints. As public administrators globally confront escalating fiscal demands from anti-obesity medications, our findings show that evaluating these novel therapeutic classes through an integrated cross-cohort labor lens is essential to understand their structural impacts on public budgets. Exploring general equilibrium adjustments and potential lifestyle moral hazard channels that could cushion, offset, or enhance these labor supply responses represents a compelling avenue for a broader welfare and public finance analysis, and we leave these macroeconomic questions for further research.

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Appendix A. Taxonomy of Metabolic and Weight-Loss Pharmacotherapies in Denmark

Table A1: Taxonomy of Metabolic and Weight-Loss Pharmacotherapies in Denmark

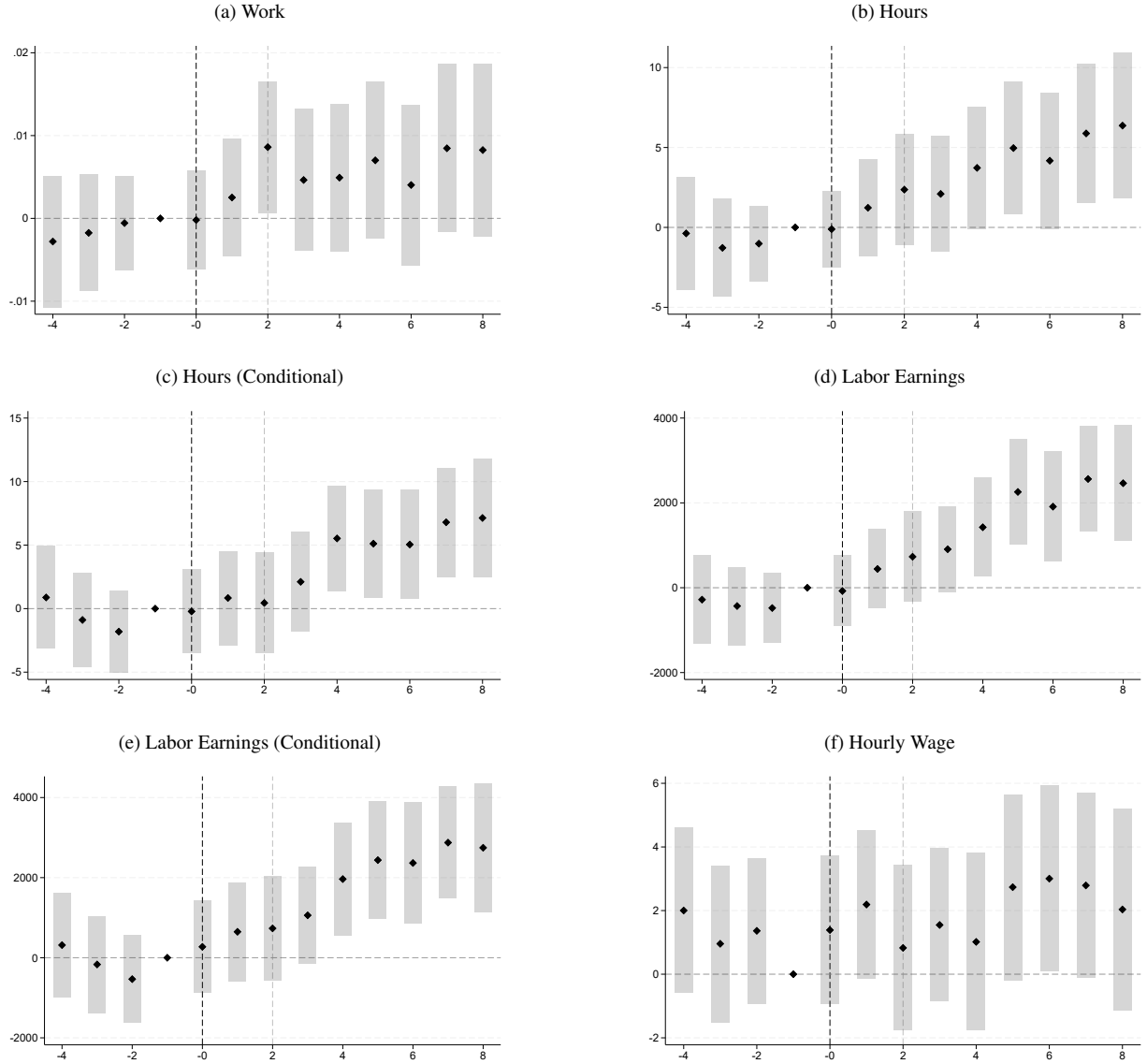
Active Molecule	Drug Class	Brand Name	Clinical Indication	Danish Subsidy Status	Key Characteristics
Semaglutide	GLP-1 RA	Ozempic	Type 2 Diabetes (T2D)	Reimbursed ^a	Once-weekly injection; substantial off-label use.
Semaglutide	GLP-1 RA	Wegovy	Chronic Weight Mgmt.	Out-of-Pocket	Once-weekly injection; higher doses often used for weight management.
Semaglutide	GLP-1 RA	Rybelsus	Type 2 Diabetes (T2D)	Reimbursed ^a	Daily oral formulation variant approved in 2019.
Tirzepatide	Dual GIP/GLP-1	Mounjaro	Type 2 Diabetes (T2D)	Reimbursed ^a	Once-weekly injection; dual receptor pathway.
Tirzepatide	Dual GIP/GLP-1	Zepbound	Chronic Weight Mgmt.	Out-of-Pocket	Once-weekly injection; approved by the FDA in late 2023.
Liraglutide	GLP-1 RA	Victoza	Type 2 Diabetes (T2D)	Reimbursed ^a	Early generation formulation; requires once-daily sub-cutaneous injection.
Liraglutide	GLP-1 RA	Saxenda	Chronic Weight Mgmt.	Out-of-Pocket	Once-daily injection; approved in 2014; precursor to long-acting analogs.

Notes: ^a Reimbursement is subject to the conditional, stepped co-payment schedule (*klausuleret tilskud*) based on cumulative annual individual spending.

Sources: European Medicines Agency (EMA) Product Information and EPAR Summaries (2022a, 2022b, 2022c); STEP-1 Trial Program (Wilding et al., 2021); and Danish Competition and Consumer Authority Report (2024).

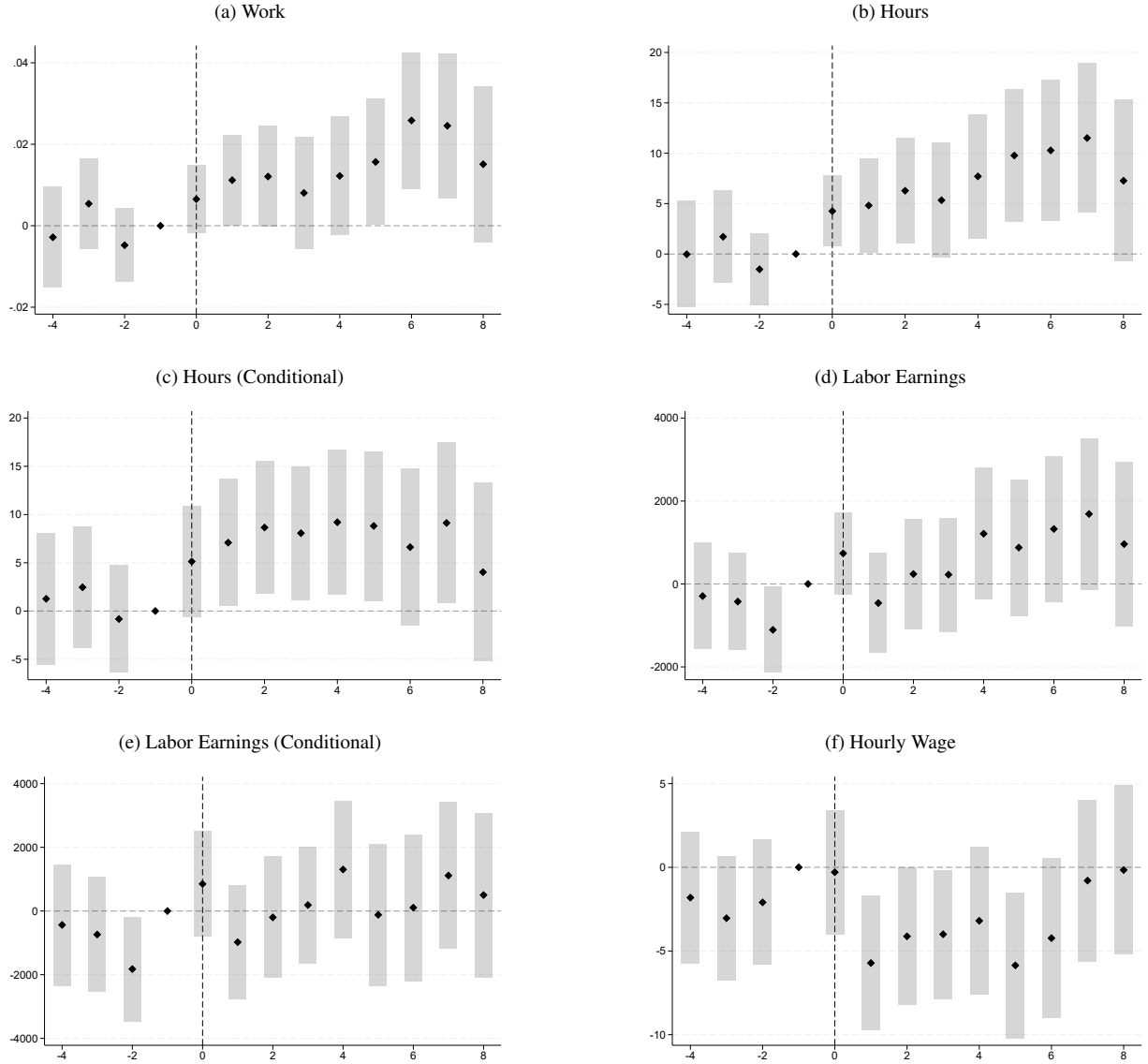
Appendix B. Robustness: Dynamic Treatment Effects of Semaglutide

Figure B1: Dynamic Treatment Effects, Ozempic (Diabetic Cohort): Dropout Sample



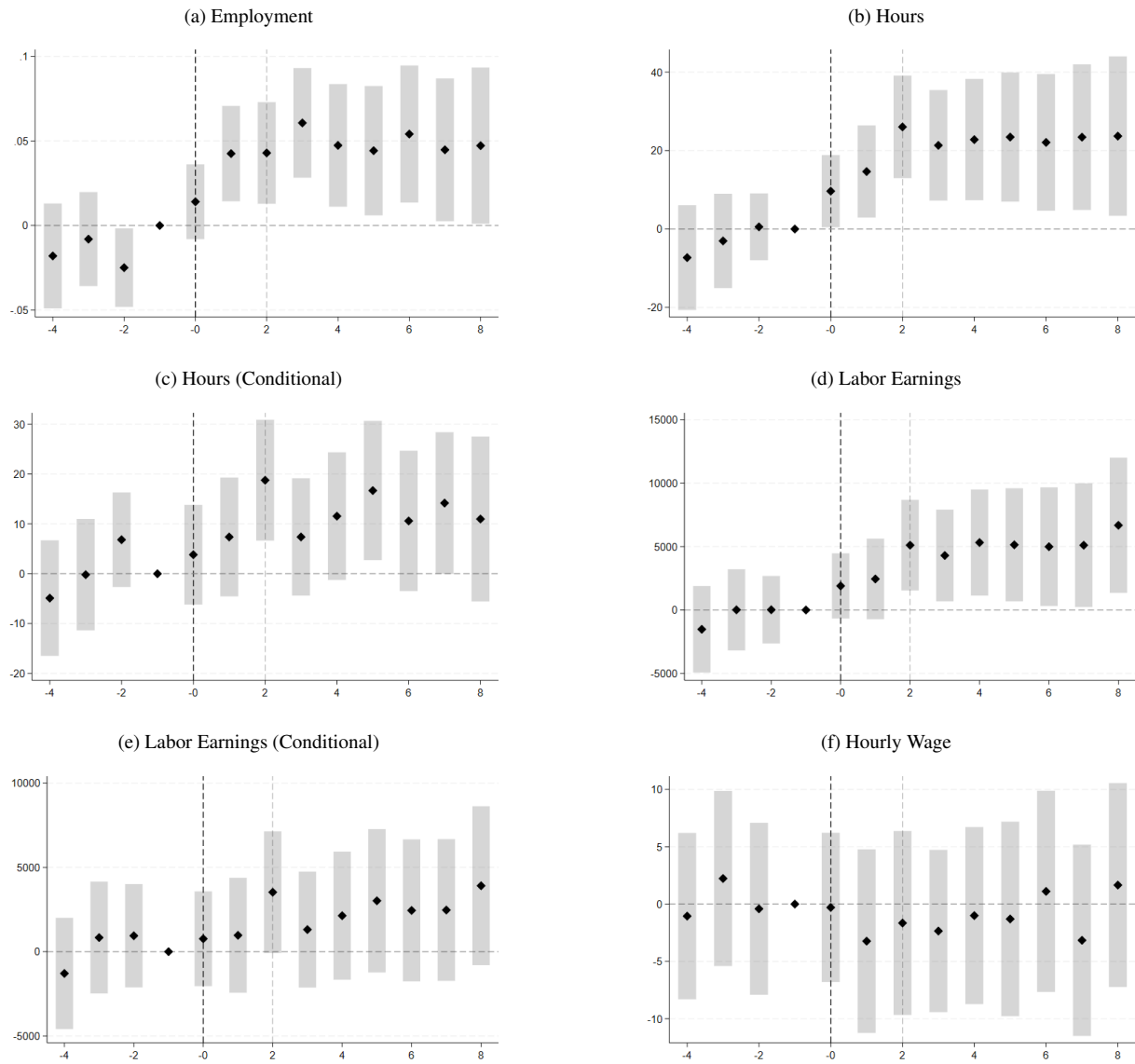
Notes: The figure reports dynamic event-study estimates for the dropout sample. Treated individuals are Ozempic initiators who continue treatment beyond the initial persistence window; comparison individuals are Ozempic initiators who discontinue within the initial window. Event time is measured relative to the first Ozempic prescription. The omitted event time is the quarter immediately before the first prescription. All specifications include event-time fixed effects, calendar year-quarter fixed effects, and individual fixed effects. Standard errors are clustered at the individual level. The black dashed vertical line marks the first Ozempic prescription. The grey dashed vertical line marks the end of the initial persistence-classification window; estimates to the right of this line capture the period after the continuous-use and interrupted-use paths have separated. The sample excludes individuals with non-diabetes Charlson comorbidities, as described in the main text.

Figure B2: Dynamic Treatment Effects, Ozempic (Diabetic Cohort): Insulin Sample



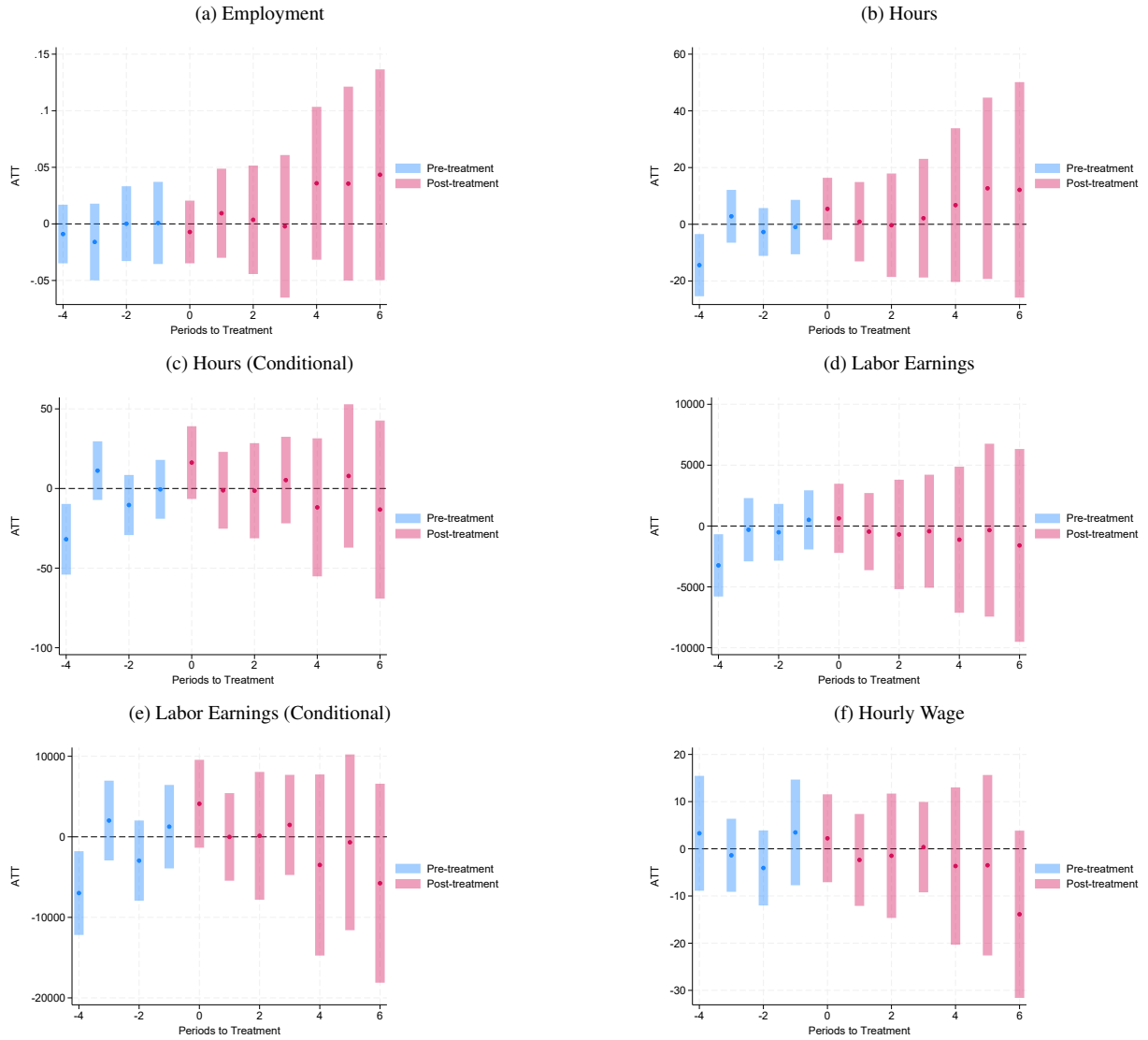
Notes: The figure reports dynamic difference-in-differences event-study estimates for insulin sample. Treated individuals are those whose first relevant diabetes treatment is Ozempic; comparison individuals are those whose first relevant diabetes treatment is insulin. Event time is measured relative to the first Ozempic prescription for the treated group and the first insulin prescription for the comparison group. The omitted event time is the quarter immediately before first treatment. All specifications include event-time fixed effects, calendar year-quarter fixed effects, and individual fixed effects. Standard errors are clustered at the individual level. The black dashed vertical line marks the treatment quarter.

Figure B3: Dynamic Treatment Effects, Ozempic (Diabetic Cohort): Propensity Score Matching Sample



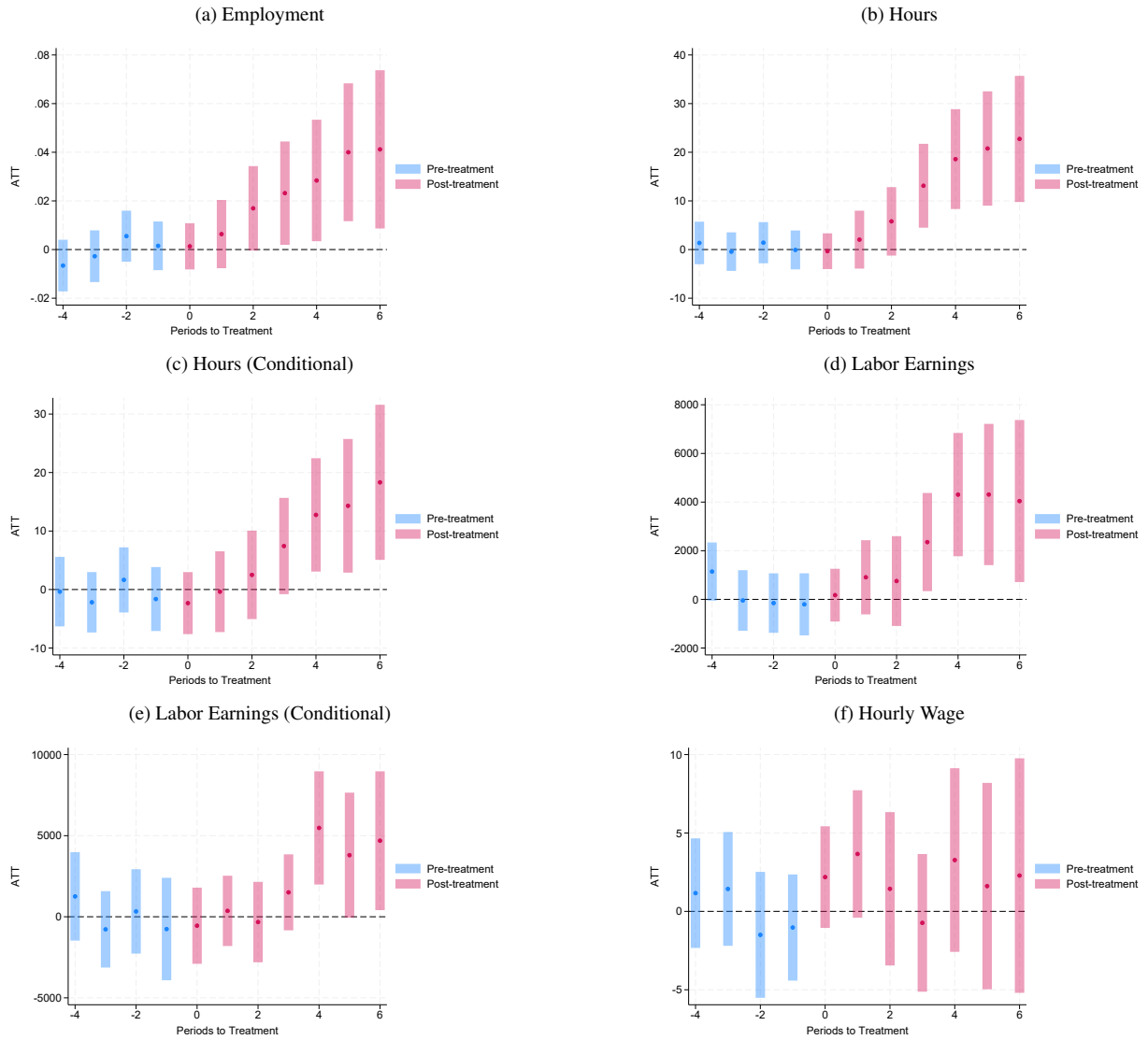
Notes: The figure reports dynamic average treatment effects from the Propensity Score Matching sample. Treated individuals are matched to comparable untreated individuals based on observed pre-treatment characteristics. Treatment is defined by the quarter of first Ozempic prescription. Employment is measured as an indicator for being employed in the quarter. Hours, labor earnings, and hourly wages are measured at the quarterly level. Conditional outcomes are restricted to individuals who are employed.

Figure B4: Dynamic Treatment Effects, Ozempic (Diabetic Cohort): Staggered DID — Subsample 1: With BMI



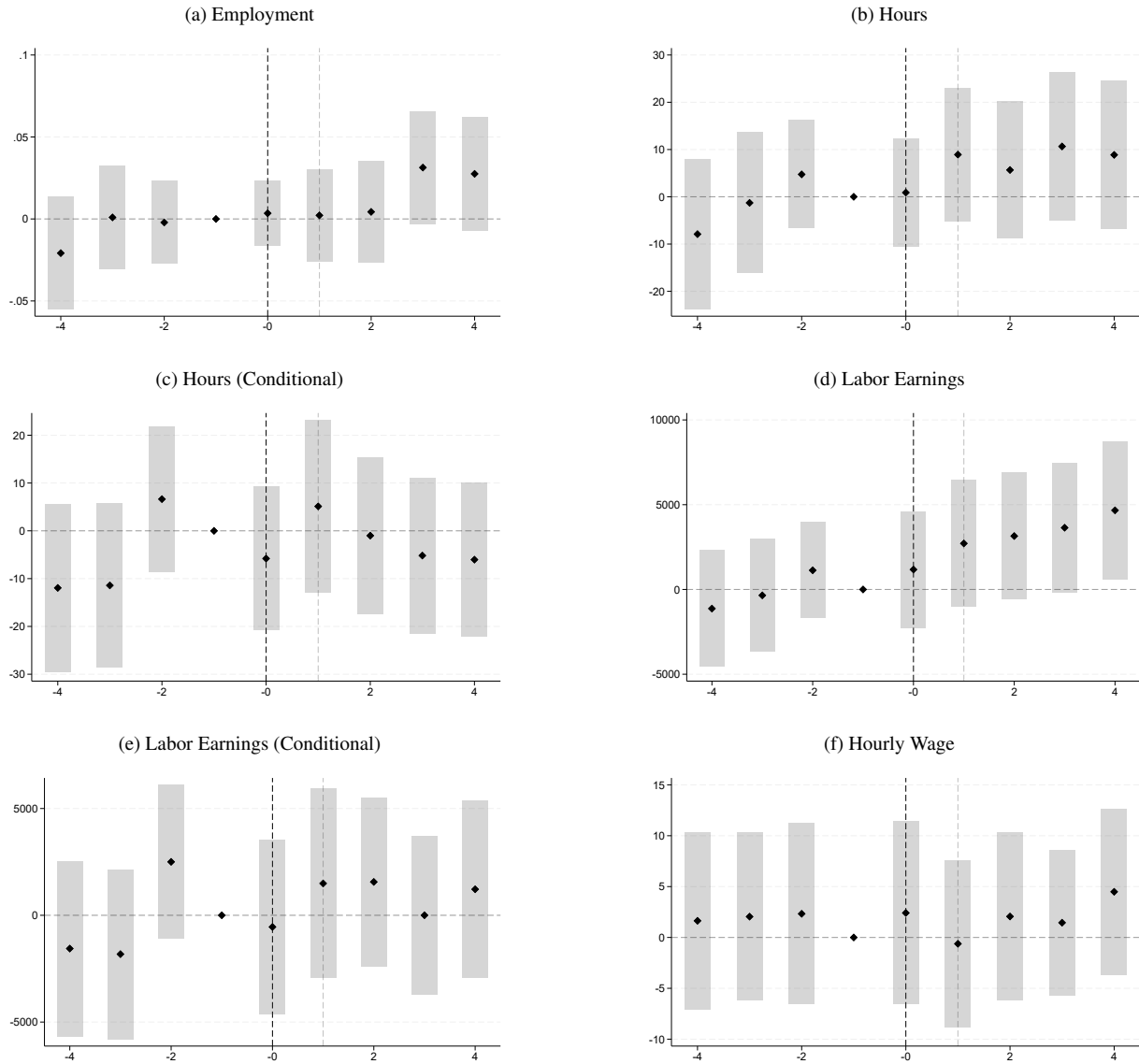
Notes: The figure reports dynamic average treatment effects from the staggered adoption design: Staggered DID (Callaway and Sant'Anna, 2021). Treatment is defined by the quarter of first Ozempic prescription. The comparison group consists of later Ozempic initiators who have not yet initiated treatment at the relevant event time. The omitted event time is the quarter immediately before initiation. Employment is measured as an indicator for being employed in the quarter. Hours, earnings, and wages are measured at the quarterly level; conditional outcomes restrict the outcome definition to individuals who are working.

Figure B5: Dynamic Treatment Effects, Ozempic (Diabetic Cohort): Staggered DID — Subsample 2: Without BMI



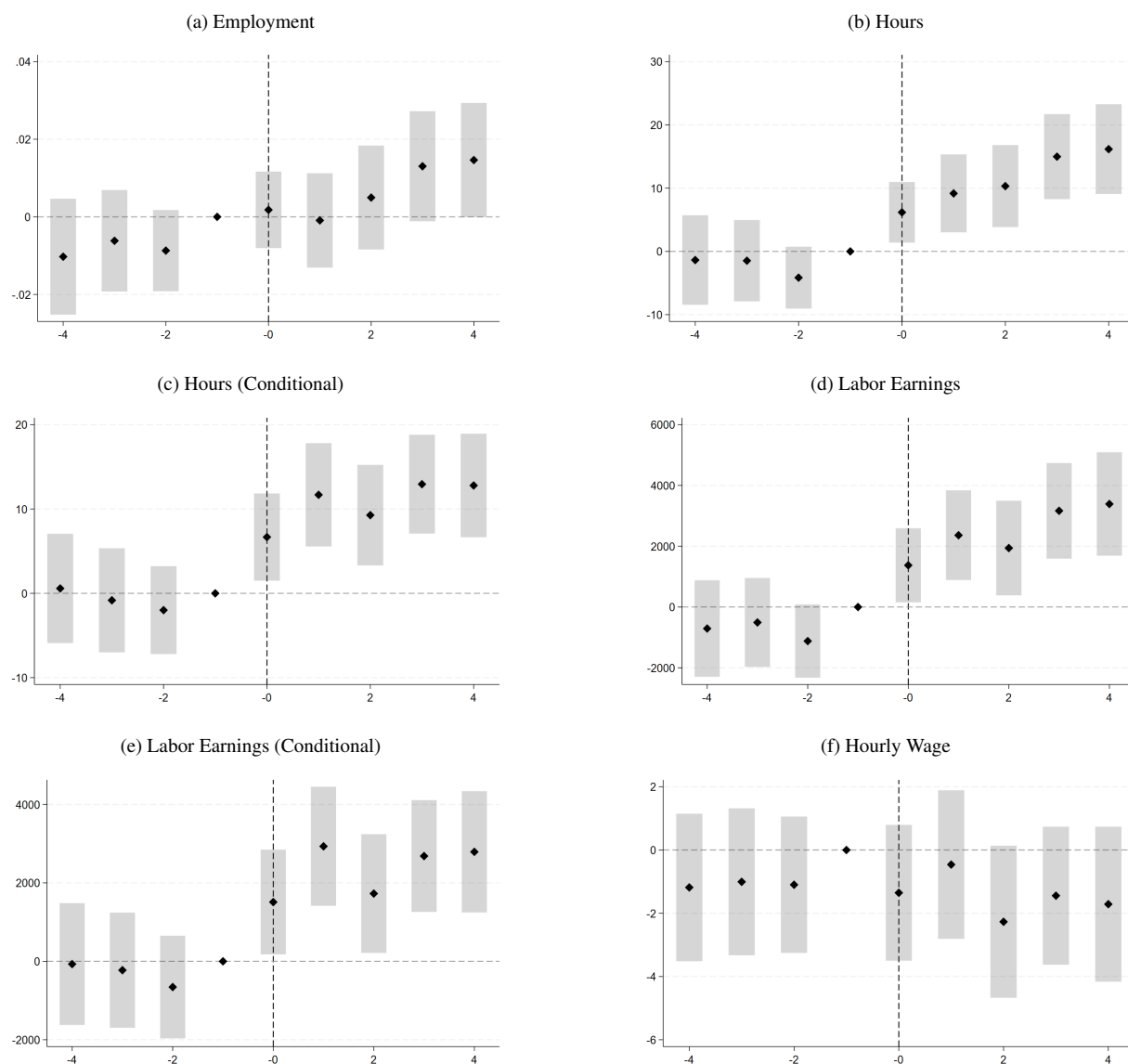
Notes: The figure reports dynamic average treatment effects from the staggered adoption design: Staggered DID (Callaway and Sant'Anna, 2021). Treatment is defined by the quarter of first Ozempic prescription. The comparison group consists of later Ozempic initiators who have not yet initiated treatment at the relevant event time. The omitted event time is the quarter immediately before initiation. Employment is measured as an indicator for being employed in the quarter. Hours, earnings, and wages are measured at the quarterly level; conditional outcomes restrict the outcome definition to individuals who are working.

Figure B6: Dynamic Treatment Effects, Wegovy (weight-management cohort): Dropout Sample



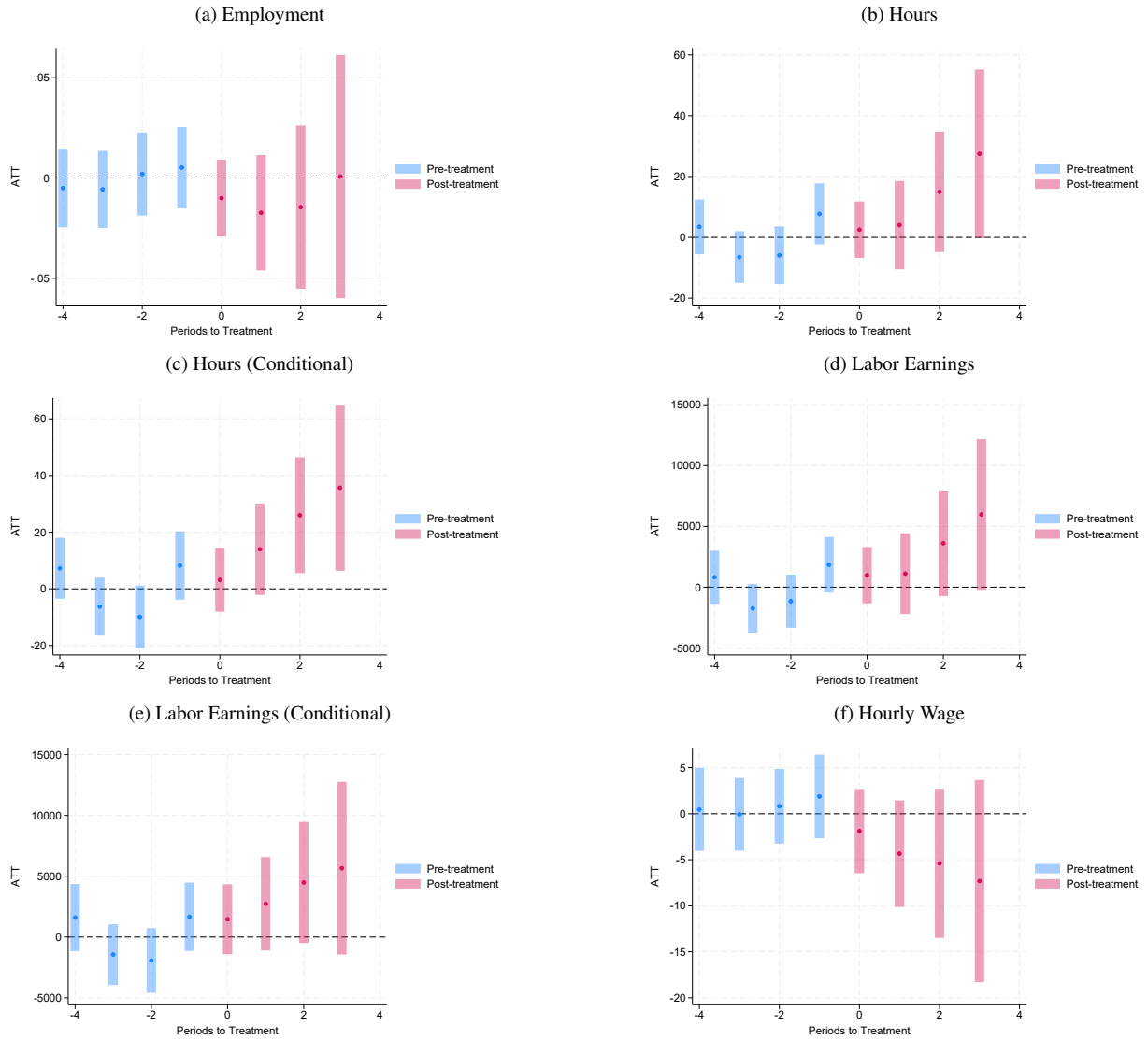
Notes: The figure reports dynamic event-study estimates for the dropout sample. Treated individuals are Wegovy initiators who continue treatment beyond the initial persistence window; comparison individuals are Wegovy initiators who discontinue within the initial window. Event time is measured relative to the first Wegovy prescription. The omitted event time is the quarter immediately before the first prescription. All specifications include event-time fixed effects, calendar year-quarter fixed effects, and individual fixed effects. Standard errors are clustered at the individual level. The black dashed vertical line marks the first Wegovy prescription. The grey dashed vertical line marks the end of the initial persistence-classification window; estimates to the right of this line capture the period after the continuous-use and interrupted-use paths have separated. The sample excludes individuals with non-diabetes Charlson comorbidities, as described in the main text.

Figure B7: Dynamic Treatment Effects, Wegovy (Weight Management Cohort): Propensity Score Matching Sample



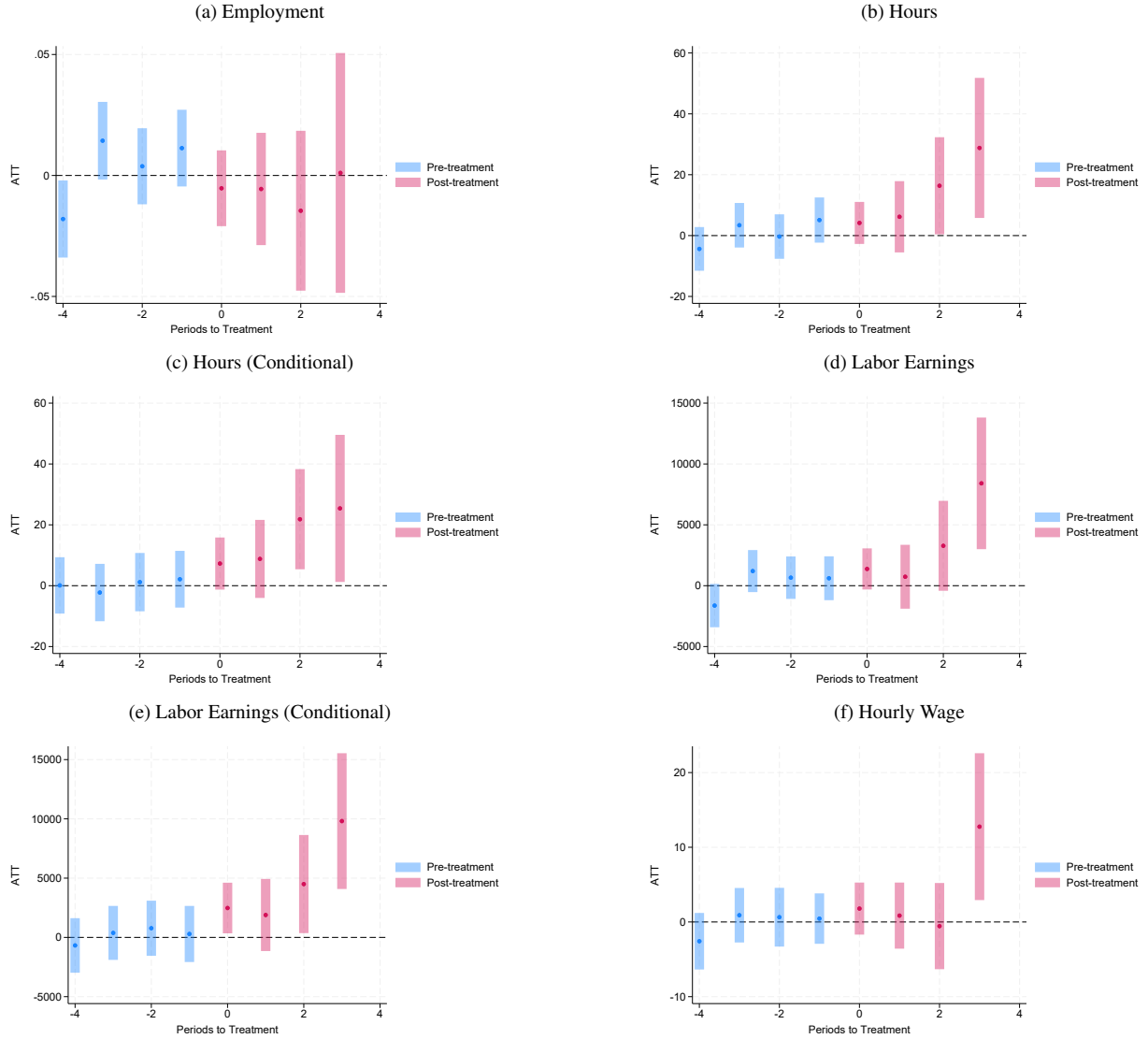
Notes: The figure reports dynamic average treatment effects using Propensity Score Matching strategy. Treated individuals are matched to comparable untreated individuals based on observed pre-treatment characteristics. Treatment is defined by the quarter of first Wegovy prescription. Employment is measured as an indicator for being employed in the quarter. Hours, labor earnings, and hourly wages are measured at the quarterly level. Conditional outcomes are restricted to individuals who are employed.

Figure B8: Dynamic Treatment Effects, Wegovy (weight-management cohort), BMI < 35: Staggered DID



Notes: The figure reports dynamic average treatment effects from the staggered-adoption design applied to the Wegovy sample. Treatment is defined by the quarter of first Wegovy prescription, and the comparison group consists of later Wegovy initiators who have not yet initiated treatment at the relevant event time. The sample is restricted to individuals with a BMI < 35. The omitted event time is the quarter immediately before initiation. Employment is an indicator for being employed in the quarter. Hours, earnings, and wages are measured at the quarterly level; conditional outcomes are restricted to individuals who are employed. Standard errors are clustered at the individual level.

Figure B9: Dynamic Treatment Effects, Wegovy (weight-management cohort) BMI ≥ 35 : Staggered DID



Notes: The figure reports dynamic average treatment effects from the staggered-adoption design applied to the Wegovy sample. Treatment is defined by the quarter of first Wegovy prescription, and the comparison group consists of later Wegovy initiators who have not yet initiated treatment at the relevant event time. The sample is restricted to individuals with BMI ≥ 35 . The omitted event time is the quarter immediately before initiation. Employment is an indicator for being employed in the quarter. Hours, earnings, and wages are measured at the quarterly level; conditional outcomes are restricted to individuals who are employed. Standard errors are clustered at the individual level.

Appendix C. Public Finance Framework: Derivation Details

To formalize the stylized net public finance accounting framework detailed in Section 5, we characterize the aggregate fiscal footprint as a linear system that balances direct single-payer regulatory outlays against individual labor market tax pass-throughs. Let N denote a baseline index of subsidized diabetic individuals (normalized to $N = 1,000$ for expositional clarity), and let $\rho = M/N$ represent the structural *User Ratio*, defined as the number of out-of-pocket weight-management workers (M) relative to the subsidized diabetic baseline in the economy.

The aggregate net public finance balance under a specific regulatory pricing regime $R \in \{2023, 2024\}$ is governed by the following mapping function, denoted by $\Phi(\rho; R)$:

$$\Phi(\rho; R) = \sum_{c \in \{O, W\}} \Delta T_c - S_O(R) \quad (C.1)$$

where $c = O$ indexes the subsidized diabetic cohort (*Ozempic*), $c = W$ indexes the out-of-pocket weight-management cohort (*Wegovy*), $S_O(R)$ represents the total annualized public subsidy outlay allocated to the diabetic track under regime R , and ΔT_c represents the total annualized labor tax revenue windfall generated by cohort c .

We discipline the tax pass-through functions, ΔT_c , by mapping a flat baseline marginal income tax rate $\tau = 0.45$ onto annualized treatment-induced individual labor earnings shifts derived directly from the post-treatment empirical elasticities documented in Section 4:

$$\Delta T_O = N \cdot \tau \cdot (4 \cdot \bar{\gamma}_{earnings}^O) \quad (C.2)$$

$$\Delta T_W = (\rho \cdot N) \cdot \tau \cdot (4 \cdot \bar{\gamma}_{earnings|emp}^W) \quad (C.3)$$

Here, $\bar{\gamma}_{earnings}^O$ denotes the unconditional average quarterly earnings treatment effect for the diabetic cohort over the stable post-treatment horizon ($\tau \geq 6$), and $\bar{\gamma}_{earnings|emp}^W$ denotes the conditional average quarterly earnings treatment effect for the weight-management cohort over its corresponding post-treatment window ($\tau \geq 4$).

Substituting equations (C.2) and (C.3) into the aggregate clearing equation (C.1) yields the structural budget-clearing layout plotted in Table 5:

$$\Phi(\rho; R) = \underbrace{\left[N \cdot \tau \cdot (4 \cdot \bar{\gamma}_{earnings}^O) - S_O(R) \right]}_{\Omega_O(R): \text{Standalone Diabetic Balance}} + \rho \cdot \underbrace{\left[N \cdot \tau \cdot (4 \cdot \bar{\gamma}_{earnings|emp}^W) \right]}_{\Omega_W: \text{Weight-Management Windfall Factor}} \quad (C.4)$$

Evaluating equation (C.4) using our preferred empirical parameters ($\bar{\gamma}_{earnings}^O = \text{DKK } 3,407$ and $\bar{\gamma}_{earnings|emp}^W = \text{DKK } 7,589$) transforms the system into a function of the institutional policy

vectors:

$$\Phi(\rho; R) = \left[6.1326 - \frac{S_o(R) \cdot 1,000}{10^6} \right] + \rho \cdot [13.6602] \quad (\text{expressed in Millions of DKK}) \quad (\text{C.5})$$

The unique cross-cohort fiscal breakeven boundary, denoted by $\rho^*(R)$, is defined as the specific user threshold where the system self-clears ($\Phi(\rho^*; R) = 0$). Solving the linear system non-parametrically yields:

$$\rho^*(R) = \frac{-\Omega_o(R)}{\Omega_w} = \frac{\frac{S_o(R) \cdot 1,000}{10^6} - 6.1326}{13.6602} \quad (\text{C.6})$$

Plugging the shifting single-payer institutional parameters documented in Section 2.2.2 into equation (C.6) provides the exact mathematical derivation for the structural threshold contractions mapped in Table 5:

- 2023 Peak Subsidy Regime ($S_o = \text{DKK } 14,130$):

$$\Omega_o(2023) = 6.1326 - 14.1300 = -8.00 \implies \rho^*(2023) = \frac{8.00}{13.6602} \approx 0.59$$

- 2024 Reference-Price Cut Regime ($S_o = \text{DKK } 8,695$):

$$\Omega_o(2024) = 6.1326 - 8.6950 = -2.56 \implies \rho^*(2024) = \frac{2.56}{13.6602} \approx 0.19$$