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Abstract

We study the impact of a one-off exogenous fiscal windfall on local public finances in the canton of Zurich in Switzerland. The windfall was due to the IPO of Glencore on the London Stock Exchange in 2011. As a result, its CEO paid an extraordinary tax bill of approximately CHF 360 million. About CHF 238 million of that extra tax revenue entered the municipal resource equalization scheme and rained down on the municipalities of the canton of Zurich. This quasi-experimental setup and our unusually rich dataset allow us to estimate the causal effect of this one-off windfall on all municipal accounting positions. We show that it triggered large expenditure increases targeting particular groups (e.g., salaries of public employees) at the same time as general tax cuts and user charge hikes (e.g., nursing home fees). The resulting imbalances caused a 7.5-fold increase in gross debt relative to the windfall. This massive overreaction hints at a substantial fiscal windfall curse.

JEL-Codes: D700, H110, H710, H720.

Keywords: local public finance, fiscal windfalls, fiscal policy.

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The Online Appendix is available on our website: www.unifr.ch/ecopub/en/research/

1. Introduction

Little is known about how a one-off fiscal windfall gain affects public finances in an advanced democracy. Some studies analyze natural resource windfalls in democratic countries like Brazil or Norway (e.g., Caselli & Michaels, 2013; Borge, Parmer, & Torvik, 2015), but these windfalls are recurring and they change the income and consumption path in a jurisdiction. A non-recurring windfall leaves all other factors unchanged, which makes it an almost ideal setting to analyze fiscal behavior. Our empirical study uses variation in Switzerland, a country with strong democratic institutions, generally good governance, and little corruption.

We analyze a unique quasi-experimental setup, in which an exogenous one-off fiscal windfall temporarily relaxed the budget constraint of local jurisdictions of the canton of Zurich in Switzerland. This allows us to estimate the causal effect of a temporal relaxation of the budget constraint on fiscal policy. It is an interesting setup because the shock allowed policy makers to allocate *additional* resources. The windfall did not change any structural parameters: the shock was transitory and orthogonal to local circumstances. These characteristics simplify the empirical analysis to uncover causal effects.

The windfall has its origin in the flotation of Glencore, a large, multinational, commodity trading and mining company, at the London Stock Exchange. The initial public offering (IPO) in 2011 enabled Glencore to raise about USD 10 billion of capital (LSEG, 2011). With this transaction, the CEO of Glencore, Mr. Ivan Glasenberg, joined the Forbes' list of billionaires (Forbes, 2019). For Mr. Glasenberg, the IPO also resulted in an extraordinary tax bill of approximately CHF 360 million (about USD 395 million in May 2011) from the canton of Zurich and his residential municipality of Rüslikon on the shores of Lake Zurich (Hotz, 2013a). About CHF 238 million of these extra tax revenues were redistributed to the municipalities of the canton through a predetermined, rule-based fiscal equalization scheme. The remaining extra tax revenues entered the budget of the canton and the municipality of Rüslikon. The induced equalization transfers were large enough to matter (about CHF 1 million on average), but small enough (maximum 4.70% of the annual current expenditures) to prevent dramatic or easily observable shifts in local public finances in a particular year. These extra transfers to the municipalities of the canton of Zurich constitute our fiscal windfall.

Given the transitory nature of this one-off windfall, we can rule out—*ceteris paribus*—permanent structural changes in local tax revenue flows. In contrast, other windfalls, such as natural resource windfalls, also change expected future tax revenues. Therefore, the Glencore

windfall provides a remarkable quasi-experimental setup to shed light on the impact of a positive transitory fiscal shock on local jurisdictions in a high-quality institutional environment.

We assemble a rich dataset containing detailed and disaggregated municipal accounting information between 2008 and 2016. This allows us to track the impact of the windfall to specific subaccounts and to uncover potential restructuring of public finances. We know when the transfer occurred and when the first information on the equalization transfers were published. We measure the windfall for each municipality and we are able to control for all relevant local parameters that determine the relative size of the windfall. Finally, we also dispose of the necessary information to separate the effect of the windfall from the potential impact of other transfers. This information allows us to estimate the causal effect of the Glencore windfall on a large number of disaggregated public finance outcomes.

In our empirical investigation, we observe relatively large *persistent* adjustments of current revenues and expenditures. On the expenditure side, we find a significant increase in personnel expenses (between CHF +0.5 and +0.9 per CHF 1 windfall annually), subsidies to local public entities as well as private individuals (between CHF +0.6 and +0.9 per CHF 1 windfall annually), and third-party services (about CHF +0.2 per CHF 1 windfall annually). On the revenue side, we document significant *persistent* reductions in personal and corporate income tax revenues (CHF -0.7 per CHF 1 windfall annually), but increases in user charges and fees (CHF +0.6 per CHF 1 windfall annually). These adjustments immediately lead to the deterioration of the current balance, and, due to the persistent nature of most adjustments, to the accumulation of significant public debt (CHF +7.5 of gross debt per CHF 1 windfall). We do not only find a massive overreaction relative to the size of the windfall, but also permanent restructuring of public expenditures and revenues.

These large adjustments led to an estimated total increase of about CHF 1.1 billion in gross municipal debt in our sample of municipalities. This looks coherent with a look at aggregate debt figures. The increase in public debt, starting in 2013, reversed an overall declining trend in municipal debt that happened over the 15 previous years. However, the increase in gross debt could be absorbed fairly easily, as municipalities, on average, featured large negative net debt (i.e., non-administrative assets are higher than the stock of liabilities) and the economic situation in the relevant period was rather fortunate. Overall, interest rates for municipal debt were close to zero and remained there over the relevant period.

Theoretically, there is no unique optimal, or unambiguously predicted, policy response to such a one-off windfall. We can derive predictions from standard normative models of public

finance. Under the permanent income hypothesis—assuming full information and a benevolent social planner—an extraordinary transitory revenue shock should be smoothed (Barro, 1979). In equilibrium, a positive (negative) transitory shock should affect capital accounts through the incurred surpluses (deficits), while tax rates and current expenditures only react incrementally. From this perspective, our transitory fiscal windfall is equivalent to a transitory positive shock to taxable incomes, and hence, current revenues. Seen as a revenue management problem (e.g., van der Ploeg & Venables, 2011; Cherif & Hasanov, 2013), we could reformulate the problem as one in which local governments seek to transform an extraordinary one-off revenue into a continuous flow of income. Here, the municipalities should either invest in projects and assets with positive net present value, or decrease the stock of debt and reduce future debt service. In neither tradition should we expect large permanent adjustments to current expenditures or revenues, large shifts across different spending and revenue categories, or substantial changes going beyond the actual revenue shock.

From the patterns of our empirical results, a politico-economic interpretation seems more likely. Besides the general tax cuts, the increases in public spending targeted the interest groups closest to local politicians and administrators. The largest expenditure increase benefited local public employees, the second largest raised subsidies to private individuals (e.g., subsidies to local sports clubs, cultural associations, etc.). These reactions are coherent with the institutional and politico-economic realities at the municipal level in the canton of Zurich.

Therefore, we propose a politico-economic interpretation in which politicians want to appeal to the electorate at large (e.g., tax payers) and provide rents to well-organized interest groups (e.g., local public employees). We code all public accounts with respect to who is affected through transactions in these accounts (large vs. small, organized vs. unorganized groups) and how well-informed citizens are about such transaction (media coverage and individual perceptibility of transactions). Our empirical results point to an interpretation in which politicians target the large, but unorganized group of taxpayers with highly mediatized and immediately perceptible tax cuts. They also target well-organized interest groups (e.g., local employees and private individuals) with benefits that are directly visible to the recipients, but remain generally hidden due to a lack of media coverage. Through the induced imbalances and the accumulation of public debt, taxpayers are finally burdened with the cost of such public policies.

Our study contributes and relates to two strands of the economic literature. First, it relates to the traditional literature on intergovernmental transfers and the flypaper effect (e.g., Henderson, 1968; Gramlich, 1969; Courant, Gramlich, & Rubinfeld, 1979; Hines & Thaler, 1995; Bailey

& Connolly, 1998; Persson & Tabellini, 2000; Inman, 2009; Allers & Vermeulen, 2016; Vegh & Vuletin, 2016; Leduc & Wilson, 2017). This literature builds around the puzzling evidence showing that vertical grants have a larger stimulatory effect on public spending than an equivalent increase in the disposable income of local residents. However, our study reveals a stimulatory effect that goes much beyond the imbalances documented in this literature.

Second, our study of a fiscal windfall relates to the large literature about the impact of natural resource windfalls. This literature provides evidence that natural resource windfalls can cause a resource curse. Countries experiencing a natural resources boom tend to save and invest too little, suffer more from corruption, and show lower levels of economic growth (e.g., Hodler, 2006; Bhattacharyya & Hodler, 2010; van der Ploeg, 2011; Caselli & Michaels, 2013; Borge et al., 2015). In contrast to the discovery of natural resources that produce long-lasting windfalls and recurring income flows, our shock is only temporary and non-recurring. While natural resource windfalls are often studied in developing economies with weak institutions, our empirical setting takes place in a highly developed country with a reputation for high-quality political institutions. Despite these differences, we find similarities in the outcomes. Even with only a transitory windfall and high-quality fiscal institutions, our results point in the direction of the resource curse. We term it the “fiscal windfall curse” and acknowledge that even strong fiscal institutions are not able to avoid it.

The rest of the article is structured as followed. In section 2, we describe the policy experiment. We explain how the Glencore windfall emerges and how it enters the municipal accounts, how we compute a municipality-specific measure of this windfall, and how the institutional environment looks at the local level. In section 3, we introduce our dataset and discuss the empirical strategy and identification. In section 4, we present our main results and discuss a series of robustness checks. In section 5, we provide potential interpretations of the observed reaction to the windfall. We confront our results with the theoretical predictions of different models and propose a politico-economic narrative for the observed patterns. Section 6 discusses open questions and avenues for follow-up research. Section 7 concludes.

2. From going public to public accounts

2.1. The Glencore windfall

In May 2011, the IPO of Glencore on the London Stock Exchange raised USD 10 billion. Glencore reached a market capitalization of about USD 59 billion (LSEG, 2011; Wachman,

2011) and the transaction became one of the largest IPOs in the history of the London Stock Exchange. Mr. Glasenberg, its CEO, held about 16% of the shares, valued at approximately USD 8.3 billion (Zaki, 2011). He joined the Forbes' list of billionaires and is still listed today with an estimated net worth of USD 7.3 billion (Forbes, 2019). As a resident and taxpayer of the municipality of Rüslikon (about 5500 inhabitants) in the canton of Zurich, Mr. Glasenberg paid an extraordinary total tax bill of about CHF 360 million of cantonal and municipal income taxes for fiscal year 2011 (Hotz, 2013a), of which about CHF 160 million went to the municipality of Rüslikon (e.g., Baumann, 2012; Schraner, 2012).¹

Out of these CHF 160 million local income tax revenue that Rüslikon received from Mr. Glasenberg, about CHF 136 million were redistributed to other municipalities through the cantonal resource equalization scheme. Due to the IPO and the mechanics of the equalization scheme, the canton of Zurich had to contribute an additional CHF 100 million to the equalization scheme (Regierungsrat des Kantons Zürich, 2016, p. 96). The equalization transfers were paid out to the municipalities in 2013, however, the actual amounts were known already in February 2012 (Schraner, 2012). While the municipality-specific equalization transfers usually evolve quite stably, the extraordinary inflow increased transfers substantially in 2013, and then returned to its normal path right after. This temporary variation constitutes our windfall.

2.2. Measuring the windfall

The municipal resource equalization scheme in the canton of Zurich is a rule-based redistributive instrument.² The equalization rules define the transfers to be paid and received by each municipality according to its tax capacity and other parameters. In general, richer municipalities redistribute resources to poorer ones, but the rule does not require that the total transfers to poor municipalities correspond to the total contribution paid by the rich. Resulting differences are financed by the canton. The transfers are unconditional.

The municipality-specific transfers (positive for poor municipalities, negative for rich municipalities) are calculated on a yearly basis and depend on only three parameters. The key parameter is the municipal tax capacity per capita that measures the municipal tax base. It is

¹ In the case of Mr. Glasenberg, there is no official information available on the exact sources of income that have been taxed. Allegedly, some partners were promised extraordinary and large dividend payments (Wachtel, 2011), and, as has to be assumed, there was the issue of pre-emptive rights. Both sources of income are taxed under the Swiss tax code.

² For details on and an evaluation of the municipal equalization scheme of the canton of Zurich, see Gulde and Hubler (2015) and Mauchle and Schaltegger (2018).

used to rank all municipalities from poorest (low tax capacity) to richest (high tax capacity) and to calculate the average tax capacity in the canton. Municipalities with a tax capacity below 95% of the cantonal average receive transfers from municipalities above 110% of that same average. Municipalities in between the two thresholds neither pay nor receive transfers (Gulde & Hubler, 2015). The other parameters are the tax multiplier (only relevant for the beneficiaries) and the population size. The tax multiplier is set at the local level. It is a surcharge on the tax schedule, which is defined at the cantonal level. Together the local tax multiplier and the cantonal tax schedule determine how intensively the tax base is exploited.

The amount to be received or paid by each municipality in year t is defined based on the municipal parameters two years prior, in $t-2$. The equalization transfers are announced at the end of $t-1$, and enter the forecasted municipal budgets. The sudden increase in Rüslikon's tax capacity in 2011 produced an exogenous fiscal shock and resulted in unexpected variations of the equalization transfers (positive and negative) in 2013. We calculate the windfall of municipality i as the difference between the observed and the counterfactual (CF) equalization transfer without the Glencore shock ($Windfall_{i,2013} = Obs.Transfers_{i,2013} - CF.Transfers_{i,2013}$).

The construction of counterfactual equalization transfers consists of correcting the equalization parameters as if the Glencore shock did not hit Rüslikon, and recalculate accordingly the entire equalization scheme. The parameter that shocked the equalization scheme in 2013 is the one-off variation in Rüslikon's tax capacity per capita in 2011. It increased from CHF 11'687 in 2010 to CHF 48'366 in 2011 and reverted back to CHF 12'037 in 2012. This increase in the tax capacity per capita was the result of Mr. Glasenberg's extraordinary tax bill.³ However, the exact amount of local income taxes paid by Mr. Glasenberg has never been officially released. Therefore, we have to rely on an approximation based on our detailed accounting data and cross-check it against information available from local newspapers and official statements. After careful consideration, we chose to approximate the counterfactual by the tax capacity per capita in 2010, a year prior to the shock, which amounts to CHF 11'687. For detailed information on our calculation of the windfall based on the counterfactual equalization scheme

³ Besides Mr. Glasenberg, other members of the top management team reside in the canton of Zurich and even Rüslikon (Schranner, 2012). Unfortunately, much less is known about how the IPO affected these people and about potential individual extra tax payments. Our calculation of the windfall is based on the total variation in the tax capacity of Rüslikon. Therefore, extra tax payments of other individuals residing in Rüslikon are automatically included. However, it seems that by far the largest part of the variation in the local tax capacity is explained by the extra tax payments of Mr. Glasenberg.

as well as graphical representations of the observed and counterfactual transfers, see Online Appendix OA.1.

Our approximation seems reliable for at least three reasons: First, the 2010 tax capacity per capita corresponds roughly to the average municipal tax capacity of the five years prior to the Glencore shock and the values it takes in the years after the shock. Secondly, in absolute terms, the approximation implies that the IPO induced a CHF 197.5 million increase in Rüslikon's total tax capacity, which corresponds to an increase in local income tax revenues of CHF 156.5 million (based on the local tax multiplier of 79%). This is very close to the estimated CHF 160 million published by local newspapers (Baumann, 2012; Hotz, 2013a). Using even another method to calculate the extra tax payment, the difference in taxable income between 2010 and 2011 leads to an approximation of the extraordinary tax bill of CHF 159 million. Again, this estimation is well in line with the CHF 160 million reported by local newspapers. Thirdly, our calculation of the counterfactual equalization transfers reveals that the Glencore IPO triggered an extraordinary contribution from the canton to the resource equalization scheme of CHF 102.4 million. This amount is corroborated in a report by the cantonal administration (Regierungsrat des Kantons Zürich, 2016, p. 96). Therefore, our calculation of the total windfall amounts to CHF 238.2 million, which includes the extra contributions of Rüslikon (CHF 135.8 million) as well as the canton (CHF 102.4 million).

We exclude the directly affected municipality of Rüslikon and the two largest cities of the canton, Zurich and Winterthur from our analysis, because they are outliers with respect to the size of the transfers and the fact that they receive additional compensations for their provision of centralized public goods and services. Moreover, six municipalities are involved in local amalgamations and we are unable to merge the accounting data for the previous periods. Therefore, the total windfall that will be used in our analysis amounts to CHF 153.6 million.

The windfall variable is always positive. For relatively poor, recipient municipalities, the windfall reflects the amount received in addition to the expected regular transfers. For relatively rich, donor municipalities, the measure corresponds to the amount saved, thanks to Rüslikon's exceptional contribution. Both cases are economically equivalent and correspond to a relaxation of the municipal budget constraint.

As shown in the summary statistics in Table 1, the average windfall amounts to about CHF 1 million, and it corresponds to 2.95% of current expenditures. Out of the 162 municipalities in our analysis, 132 received a larger equalization transfer and 23 relatively richer municipalities saw their annual contribution reduced. Only seven municipalities remained unaffected. With or

without the Glencore shock, the tax capacity of those municipalities stood in between the upper and lower equalization thresholds.

Table 1: Descriptive statistics of the municipality-specific windfall.

	Obs.	Mean (std. dev.)	Min	Max
<i>All municipalities</i>				
Windfall, in CHF	162	948'415.70 (1'116'087.78)	0.00	6'760'142.00
Windfall per capita, in CHF	162	184.60 (57.08)	0.00	227.00
Windfall in % of current rev.	162	2.61 (0.94)	0.00	4.00
Windfall in % of current exp.	162	2.95 (1.07)	0.00	4.70
<i>Beneficiaries</i>				
Windfall, in CHF	132	958'590.89 (1'159'860.91)	69'458.00	6'760'142.00
Windfall per capita, in CHF	132	203.09 (34.06)	22.00	227.00
Windfall in % of current rev.	132	2.92 (0.62)	0.22	4.00
Windfall in % of current exp.	132	3.30 (0.72)	0.26	4.70
<i>Contributors</i>				
Windfall, in CHF	23	1'178'667.22 (873'580.79)	66'270.00	2'824'020.00
Windfall per capita, in CHF	23	134.70 (37.88)	4.00	149.00
Windfall in % of current rev.	23	1.66 (0.72)	0.06	2.94
Windfall in % of current exp.	23	1.86 (0.80)	0.06	3.48

Note: Summary statistics exclude Rüslikon, the largest cities of Zürich and Winterthur (both receive additional transfers as they provide additional public goods and services), and 6 municipalities involved in an amalgamation, for which proper data are not available over the entire period.

2.3. Local public finances in the canton of Zurich

The canton of Zurich is the most fiscally decentralized canton in Switzerland. The ratio of local expenditure relative to the sum of local and cantonal expenditures is about 50%. The municipalities enjoy great autonomy in the definition of the services and infrastructure they provide. They are responsible for compulsory education at the primary and secondary school levels (30% of current expenses), social assistance (15%), and local health services (5%). Municipalities also provide other public goods and services regarding culture, security, transportation, and the environment. Finally, infrastructure investments account for a

significant share of municipal budgets (on average 15% of total annual expenditures). The provision of some of those services is subject to cantonal, sometimes even national, standards. However, the municipalities are far from being simple providers of public services defined by upper-layer governments.

On the revenue side, municipalities are subject to the equivalence principle. They primarily finance expenditures with revenues raised through their own taxation of local sources of income and wealth. On average, about half of the municipal revenues come from the direct taxation of natural persons' incomes and firm profits. The overall tax scheme is defined by the canton, while municipalities decide on a tax multiplier. The second source of municipal revenues is user charges and fees (18% of current receipts, on average). Unconditional transfers account for only 10% of municipal current revenues, and transfers with a counterpart for 5% on average. This makes the municipalities relatively independent of inter-governmental transfers compared to other local governments worldwide. Municipalities can incur debt. Most local debt today is through bank lending and only larger cities borrow directly in financial markets. Interest rates for municipal debt were very low in general and often close to zero. Municipalities are subject to a credible no-bailout provision, which was upheld by the highest federal court in a famous ruling in 2003.

The general situation of local public finances in the canton of Zurich can be described as sustainable. All standard public finance measures indicate that the municipalities are, on average, well managed and financially stable. They record neither systematic deficits nor unsustainable levels of public debt, and they have easy access to external financing, primarily through bank loans. Moreover, their fiscal institutions (fiscal supervision, financial referendum, direct democracy, etc.) meet high standards and have a reputation of achieving a high degree of fiscal conservatism (e.g., Feld & Kirchgässner, 2001; Schelker & Eichenberger, 2010).

2.4. Municipal governance

Municipalities are managed by a local administrator and its staff. They are responsible for the daily operations and they are best acquainted with local circumstances and developments. Politically, municipalities are governed by the "local council", which constitutes the executive and is made up by 5 to 9 members. Local council members are usually part-time politicians. They rely heavily on local administrators to formulate and implement policies. The legislative

organ is the municipal assembly or, in 13 cases, a local parliament.⁴ With the assistance of the local administrators, members of the local executive prepare the budget, which has to be accepted by the municipal assembly or the local parliament, and they execute the budget. They have important autonomy in running the local administration, make personnel decisions, and allocate resources within the limits of the budget.

The fiscal supervision is delegated to the local finance commission, comprised of local citizens. They audit the budget and the accounts, analyze and criticize spending propositions, and they issue a report and can make amendment propositions in municipal assembly meetings (see Schelker & Eichenberger, 2010). Municipalities have installed mandatory budget referendums, which have to be held, as soon as a spending proposition goes beyond a certain threshold. The thresholds for recurring expenditures vary between CHF 40'000 and CHF 1 million and for one-off expenditures between CHF 250'000 and CHF 5 million. Changes to the local income tax multiplier have to be approved by the citizens during the municipal assembly.

Local elections were held in 2014. Most municipalities only elect the local executive, while citizens constitute the legislative body via municipal assemblies several times a year. Only 13 municipalities elect a local parliament. Parties play a weaker role at the local level and not all national parties are represented and polarizations is not pronounced. Moreover, municipalities regularly face the problem of finding sufficient numbers of candidates to fill the required executive positions. Therefore, political competition is often not intense. Detailed information at the individual level are not available and we have to abstain from an electoral analysis.

3. Data and identification

3.1. The data

Our dataset contains 162 municipalities, for which we have assembled detailed municipal accounting data.⁵ All municipalities use the same accounting model and the same rules apply during the entire period (Direktion der Justiz und des Innern des Kantons Zürich, 1984).⁶ Our main results come from the years centered around the windfall in 2013 and span the period

⁴ Among the 162 municipalities of our sample, 9 municipalities have a local parliament over the whole period and one municipality introduced a parliament in 2014.

⁵ In 2013, the canton of Zurich had 171 municipalities. We exclude the large cities of Zurich and Winterthur, as they represent clear outliers (size, population, beneficiaries of particular transfers for agglomerations, etc.). Three amalgamations involving six municipalities took place since 2013. We finally exclude Rüslikon, the municipality from which the windfall spreads.

⁶ Online Appendix OA.2 provides an overview of the accounting framework and shows the links between the accounts of current and investment flows and the capital account.

from 2008 to 2016. This is also the period for which we have the most detailed and disaggregated data, containing not only the major accounts (e.g., personnel expenses, tax receipts, user charges), but also its subaccounts such as salaries of administrative and operating staff, salaries of teachers, social security contributions, income tax receipts of natural persons and legal entities, or receipts coming from nursing home and school fees, etc. For the main accounting categories, data is available back to 2000. These more aggregated categories are used in a series of robustness checks. We also collected economic, demographic, and socio-economic variables for the entire period.

3.2. Identification

We are interested in the causal effect of the fiscal windfall on local public finances. This consists of estimating where the windfall spread in municipal accounts, i.e., which accounts are affected by the windfall and by how much. Glencore's IPO and the respective inflow of tax revenues into the equalization scheme are clearly exogenous to local public finances. Yet, the redistributive rule of the equalization scheme determining the size of the municipality-specific windfall is not. The municipality-specific windfall depends on the parameters of the equalization scheme.⁷ Therefore, the windfall is exogenous conditional on controlling for these parameters. In other words, identification hinges on a standard conditional independence assumption (e.g., Wooldridge, 2002). Specifically, we control for the regular equalization transfers, which are the direct outcome of three equalization parameters. An advantage of including the product of said parameters (regular equalization transfers) over including them individually, is the intuitive public finance interpretation of transfer payments relating them directly to the budget constraint.

It is important to note that an additional complication must be considered: The equalization rule relevant for the calculation of the windfall only entered into force in 2012. In this year, the canton of Zurich implemented a reform aiming at disentangling the tasks between the canton and its municipalities and to make the transfer flows more transparent (Regierungsrat des Kantons Zürich, 2016). After the reform in 2012, the equalization transfers were split into three components: 1) the resource equalization transfers (our main category discussed above), 2) the demographic equalization transfers, and 3) the topographic equalization transfers. Both latter transfers are independent of the Glencore IPO and remain unaffected. Fortunately, our detailed accounting data enable us to fully capture the budgetary implications for the municipalities over

⁷ For details about the equalization rules and a replication of equalization transfers, see Online Appendix OA.1.

the entire period. We observe all actual transfer flows before and after the reform and, hence, are able to capture all relevant potential changes to the municipal budget constraint. As a result, our estimations include the sum of all equalization transfers, excluding the windfall in 2013. Therefore, comparable data is available also for the pre-reform period before 2012.

3.3. Empirical strategy

The Glencore windfall produced a *temporary* relaxation of the municipal budget constraint in 2013. Given that we focus on the absolute relaxation of the budget constraint, the quantity of interest is expressed in absolute budgetary terms. Therefore, we specify our regression models in absolute values (in CHF) and not in terms of elasticities (logs) or per capita values.

The windfall entered the municipal accounts in 2013, but its origin is anterior to the effective equalization transfers. As planned by the equalization calendar, the official information with the exact equalization transfers to be paid or received was announced in September 2012 to all municipalities. However, the municipalities received the information about the estimated impact of Glencore's flotation on Rüşchlikon and the implication for the equalization scheme at the latest in early 2012. The first newspaper report on the issue that we found was published on February 7th, 2012 (Schranner, 2012). It is likely that the municipal executives received information about potential implications for the equalization transfers even before that date, but clearly only after the actual IPO in May 2011. As a result, municipalities were clearly able to fully internalize the windfall for the forecasted 2013 budget, but the windfall could already be anticipated in the budgetary period of 2012. For this reason, 2012 has to be considered as a treated period.

The windfall could spread in many accounts, making the number of outcomes plentiful. We consider *all* public finance outcomes in the municipal accounting framework (all main accounting categories and subaccounts).

The regression specification is the following:

$$Y_{it}^j = \alpha + \sum_{\tau=-1}^{\tau=3} \beta_{\tau} Windfall_{i,2013+\tau} + \vartheta Equalization\ transfers_{it} + \mathbf{X}_{it} \boldsymbol{\theta} + \vartheta_i + \mu_t + \epsilon_{it},$$

with the indices i and t referring, respectively, to municipalities and years, and τ reflecting the lag and lead structure of the variable of interest. The index j refers to each accounting variable

(Y_{it}^j) considered (38 main accounts and 148 subaccounts). The specification always includes municipal (ϑ_i) and time (τ_t) fixed effects.⁸

The variable *Windfall* measures the Glencore shock as it affects the municipalities of the canton of Zurich through its impact on the fiscal equalization scheme. This variable is zero for all years but 2013 when the windfall occurs. The coefficient β_{-1} reflects the impact of the windfall as it is anticipated in 2012, one year prior to the effective transfer. β_0 measures the effect of the windfall in 2013, the year of the effective transfer. To account for a potentially persistent impact of the windfall, we include lags for 2014 (β_1), 2015 (β_2), and 2016 (β_3). Note that, when the outcome variable is an accounting stock (assets or liability), the interpretation differs slightly. Then the coefficients of interest express the *cumulative effect* of the windfall.

The variable *Equalization transfers_{it}* accounts for the regular (counterfactual) equalization transfer and is necessary for the causal identification of the windfall effect. As discussed in the previous section, it includes the resource equalization transfers (net of the windfall) and all other equalization transfer flows (independent of the Glencore IPO) that might affect the budget constraint.

With the inclusion of X_{it} , we control for a series of other factors that might affect annual variations in fiscal policy outcomes: First, we account for economic and socio-demographic municipal characteristics, such as the contemporaneous size of the local population, the share of young inhabitants (<20), the share of old inhabitants (>65), the unemployment rate, and the contemporaneous fiscal capacity as a measure of local economic circumstances. Second, we add the revenue from the property gains tax. This revenue comes from private transactions on the real estate market, which are extremely difficult to forecast, can be subject to large annual variations, and can provide substantial additional fiscal income. Importantly, the tax rate on such transactions is fixed by the canton and is, thus, not a local policy variable. Neither do we expect, nor do we observe this variable to affect our point estimates. However, the inclusion affects precision and we want to make sure that such flows are captured in our regressions. Third, the reform of the allocation of tasks between the canton and the municipalities in 2012 also affected a small number of accounting outcomes. The reform aimed at disentangling some financial flows between the canton and its municipalities related to the (joint) production of public goods and services. As discussed before, these changes are well documented and affect

⁸ Municipal time trends are not included in the main estimations because of the short time frame (2008–2016). They are introduced in the specification that considers the longer period 2000–2016.

municipalities primarily through transfer flows (Regierungsrat des Kantons Zürich, 2016).⁹ As a result, we control for the municipal compensations and subsidies with counterparts to and from the canton, and we control for the potential outsourcing of municipal tasks to associations of municipalities, with the municipal compensations and subsidies to and from other municipalities and associations of municipalities. Controlling for these changes allows us to hold budgetary implications of the reform constant over the analyzed period. As should be noted upfront, none of the outcomes found to have changed as a reaction to the windfall are affected by the specific reform of 2012. Appendix Table A1 presents the descriptive statistics of the major accounts (outcome variables) and of our main control variables.

4. Empirical results: Where does the windfall spread?

As a starting point, we estimate the impact of the windfall on some well-known accounting aggregates (section 4.1). The advantage of showing regressions on these aggregates is to build an intuition for the total effect of the windfall on some standard public finance outcomes. It also helps to illustrate the limitations of this aggregated approach: First, this level of aggregation does not provide information on how the windfall is actually spent. Second, the effects on the aggregated outcomes cannot expose shifts across accounts. Third, and more technically, total revenues and expenditures, i.e., current accounts, include parts of the windfall, as it enters the current expenditures for the municipalities receiving higher transfers and the current revenues for those with reductions to their expected payments. Therefore, our main results will focus on disaggregated accounts in section 4.2.

4.1. Aggregate effects

Table 2 reports the estimated effect of the windfall on current expenditures, current revenues, current balance, cash flow, net investments, gross debt, and net debt. The first five outcomes are measures of accounting flows, whereas gross and net debt are accounting stocks.

In column 1, we observe a large increase in current expenditures. For a CHF 1 windfall received in 2013, the total current expenditures increase by CHF 2.25 in 2012. In other words, municipalities anticipated the windfall and, right from the start, its impact was already larger than the transfer was. The effect fades out over time, but persists until 2015. Note that the year 2013 includes reduced equalization transfer payments of 23 municipalities. Column 2

⁹ We have checked and reconfirmed the relevant changes with the office for municipal affairs of the canton of Zurich (Gemeindeamt des Kantons Zürich).

documents that the total current revenues increase in 2012 and 2013. The 2013 effect includes the entry of the windfall transfers into the accounts of the net-recipient municipalities. With a large positive effect on current expenditures and overall only small and transitory adjustments to the total current revenues, the windfall negatively affects the current balance (column 3), as well as the cash flow (column 4).¹⁰ Regarding net investment expenditures (column 5), the estimation reveals a delayed adjustment with a significant increase only in 2016. In addition, the windfall significantly affects accounting stocks over time. In 2016, the cumulated effect of the windfall amounts to CHF 7.45 per CHF 1 of windfall on gross debt,¹¹ and CHF 7.13 on net debt.¹²

Table 2: Impact on accounting aggregates.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Current expend.	Current revenue	Current balance	Cash flow	Net investment	Gross debt	Net debt
Windfall ₂₀₁₂ (β_{-1})	2.245*** (0.526)	0.805 (0.622)	-0.945** (0.414)	-0.600 (0.449)	0.327 (0.497)	-0.0956 (2.035)	0.794 (1.752)
Windfall ₂₀₁₃ (β_0)	1.877*** (0.493)	0.824* (0.490)	-0.586 (0.529)	-0.985** (0.485)	0.196 (0.425)	0.818 (2.164)	2.984 (2.043)
Windfall ₂₀₁₄ (β_1)	2.032*** (0.500)	0.148 (0.540)	-1.204** (0.514)	-1.657*** (0.501)	0.0873 (0.478)	2.551 (2.456)	4.975** (2.151)
Windfall ₂₀₁₅ (β_2)	1.264** (0.611)	-0.166 (0.626)	-0.595 (0.588)	-0.913* (0.549)	0.477 (0.516)	4.076 (2.736)	6.167** (2.451)
Windfall ₂₀₁₆ (β_3)	0.150 (0.659)	-0.369 (0.790)	0.0615 (0.730)	-0.176 (0.705)	1.489* (0.798)	7.454** (3.651)	7.130** (3.035)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Municipal FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1458	1458	1458	1458	1458	1458	1458
Municipalities	162	162	162	162	162	162	162
R ²	0.872	0.868	0.638	0.640	0.126	0.221	0.347

Standard errors are clustered at the municipality level and are reported in parentheses.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

4.2. Analyzing disaggregated effects

Analyzing large aggregates only uncovers the *net* effects of various potential operations in the underlying accounts. Our data, in contrast, reveal in detail where the windfall spread. Therefore,

¹⁰ Cash flow = current balance – depreciations. The cash flow is also known as “self-financing.”

¹¹ Gross debt = short-term debt + medium-term debt + long-term debt + commitments toward other entities.

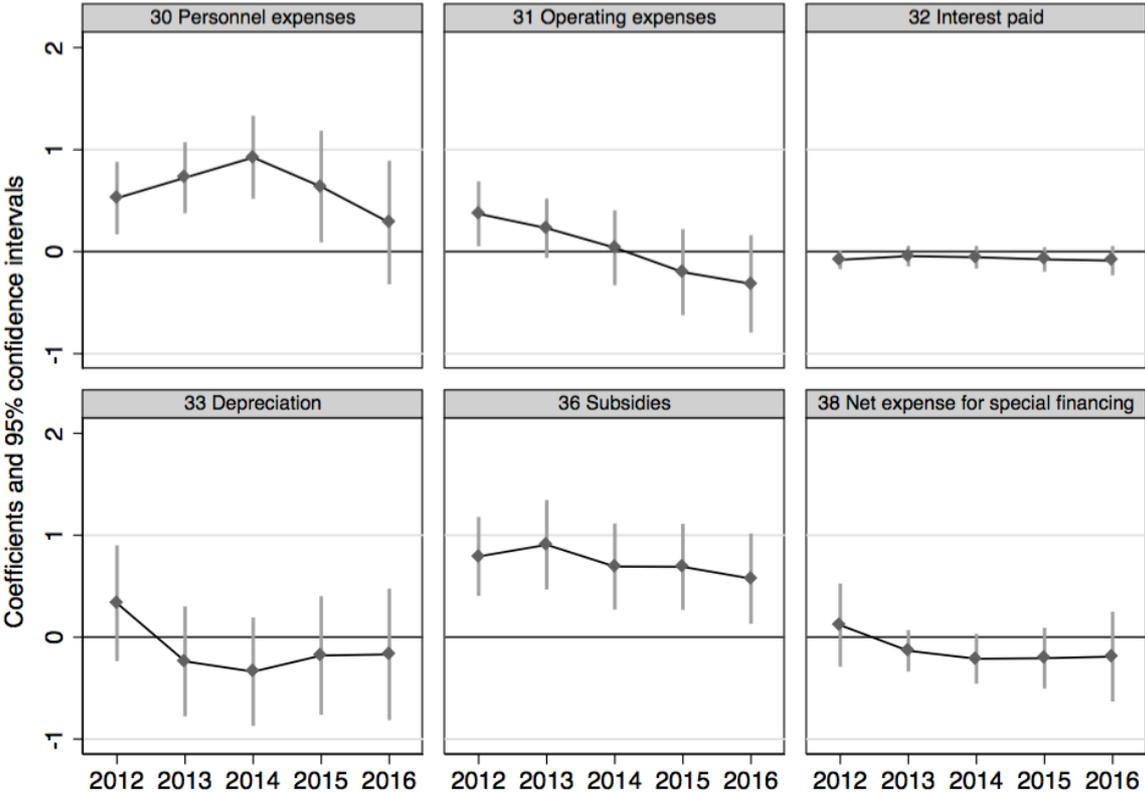
¹² Net debt = total stock of liabilities – non-administrative assets.

we run our regression model on *all* outcomes reported in the relevant accounts and subaccounts.¹³ In the following series of graphs, we report a selection of estimated coefficients and the associated 95% confidence intervals. We report results that are not only statistically significant but also economically relevant (e.g., McCloskey & Ziliak, 1996; Amrhein, Greenland, & McShane, 2019). The results of *all* outcomes are presented in the Online Appendix OA.6.

4.2.1. Impact on current expenditures

Figure 1 displays the regression results of the windfall on the main categories of current expenditures. We exclude the transfer accounts, which must enter as covariates in the regression, and accounts that purely serve accounting purposes and have no economic meaning. In a following step, we further disaggregate some of these accounts and present results on some of the subaccounts that show more precisely how the windfall spread.

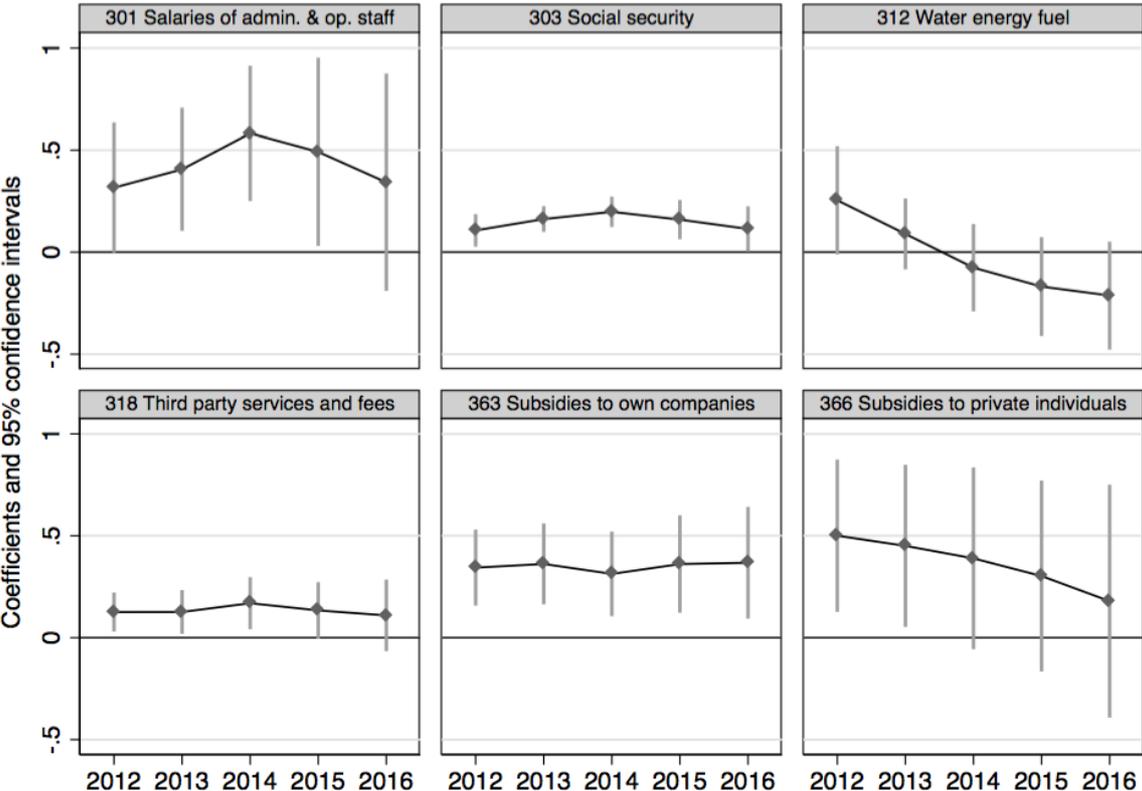
Figure 1: Effects on current expenditure, *main accounts*.



¹³ See Online Appendix OA.2 presenting an overview of the accounting framework and its resulting outcome variables.

The windfall affects mainly three accounting categories (Figure 1): personnel expenses, operating expenses, and subsidies. Paid interest, depreciations, and the attribution to reserves (net expense for special financing) seem less (systematically) affected. While the impact on total operating expenses is only temporary (significant effect in 2012 only), personnel expenses and subsidies are more strongly and more persistently affected (by up to CHF 0.92 in 2014). The increase in subsidies remains relatively constant over time, while the adjustment on personnel expenses fades out after 2015. Considering only these three accounts, the windfall induces adjustments that exceed its own size. The data permits digging even deeper by looking at all respective subaccounts, where some interesting patterns emerge.

Figure 2: Effect on current expenditure, *subaccounts*.



The sizable overall effect on personnel expenses stems mostly from salaries to administrative and operating staff (Figure 2, upper left). Mechanically, the increases in salaries must also affect mandatory social welfare contributions (second, upper middle graph). The salaries of teachers are unaffected (not reported). The effect on salaries does not necessarily mean that municipalities start hiring new staff. It could also be that employees are able to increase their workload or move up in the respective salary schedule. Unfortunately, there is no data available

to us to separate the two mechanisms. The effect is quite persistent in both cases. On a smaller scale, temporary compensations and in-kind benefits experience temporary increases (not reported). But what about the (relative) size of these effects? We have seen that the total personnel expenses increase by up to 92 cents per 1 CHF of windfall, which corresponds to less than 10% of total personnel expenses. The size of the effect seems substantial, but remains within a credible order of magnitude.

Total administrative and operating expenditure in Figure 1 shows a temporary increase in 2012 (CHF 0.37). The analysis of the subaccounts “Water energy fuel” and “Third party services and fees” in Figure 2 reveals restructuring in this spending category. The increase in 2012 is driven by a temporary increase in energy expenditure. The remaining part of the total effect comes from an increase in third-party services (e.g., consultancy fees, office or supervisory work performed by third parties). The windfall not only induced a temporary adjustment in the total administrative expenses, but it affected more persistently the structure of this spending category.

Figure 1 shows permanent increases in total subsidies (about CHF 0.73 annually, on average). Figure 2 reveals that these additional subsidies go mostly to local public companies¹⁴ (about CHF 0.35) and private individuals (about CHF 0.36, on average). For a typical municipality, local public companies are the industrial services (water, electricity, waste disposal) or nursing homes. These entities see their subsidies increase permanently over the treated period. Subsidies to private individuals cover a wide range of different types of transfers. They can include, for instance, individual support and study grants, culture, sports, public health, or social welfare expenditures. Evaluated against the average subsidy payments of CHF 9.9 million per year (Table A1), the increase due to the windfall amounts to about 7% of total subsidies disbursed.

In conclusion, the estimated effects of the windfall on current expenditures reveal three main patterns: First, adjustments take place where municipalities have flexibility in the short run. Second, the response to the windfall is not limited to the year of the actual transfers. The windfall is anticipated and many adjustments are persistent. Third, our results show a massive overreaction to the windfall. Considering only the significant estimates of the expenditure-side

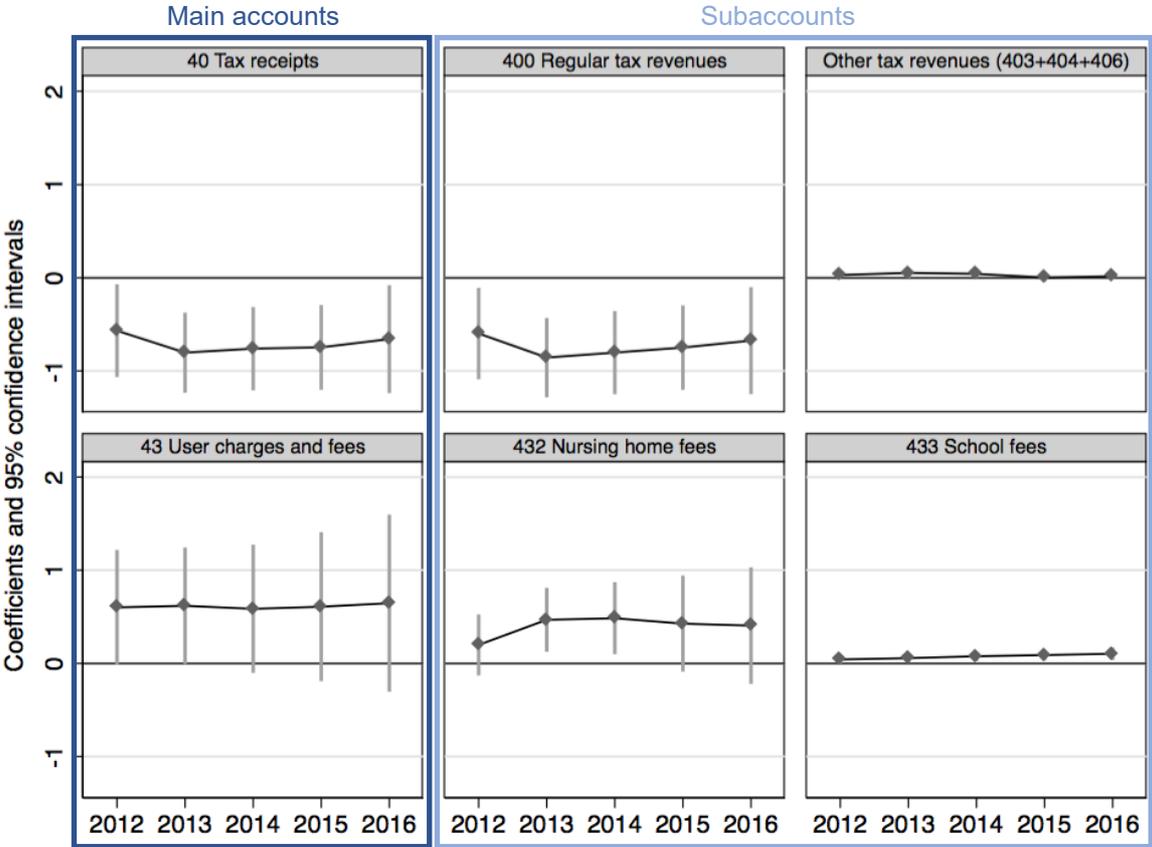
¹⁴ “Own” public companies are companies, establishments, or institutions owned by the municipality, or with governing bodies directly appointed by local authorities.

of the current account, a CHF 1 windfall induced—as early as 2012—a CHF 1.69 increase in current spending, which accumulated to about CHF 6.84 in the observed period until 2016.

4.2.2. Impact on current revenues

The estimation of the effect on total current revenue (Table 2) does not point toward large significant adjustments. However, the focus on disaggregated outcomes provides a very different picture. The windfall affects mainly two categories: tax receipts and user charges and fees (Figure 3). These are exactly the accounts where municipal autonomy is highest. The three upper graphs show the effect on taxes in total (upper left), and two respective subaccounts “Regular tax revenues” (upper middle) and “Other tax revenues (403+404+406)” (upper right). The significant permanent decrease in total taxes amounts to approximately CHF 0.71 annually. The effect comes exclusively from reductions in regular municipal income and profit taxes and not from other fiscal revenues such as the taxation of property transactions. The tax reduction reflects the direct redistribution of the windfall to taxpayers. The relative size of the induced tax cut is approximately equivalent to an average reduction of 3% of total tax revenues.

Figure 3: Effect on current revenue, *main* and *subaccounts*.



In stark contrast to the permanent tax reductions are the permanent increases in user charges (Figure 3, lower left). The size of the effect is slightly smaller and comes from two specific subaccounts, nursing home fees (lower middle) and school fees (lower right). However, in comparison to the increases in nursing home fees (CHF 0.40) the increase in school fees is negligible. Everything else being equal, this translates into an increase in the pricing for those services. In relative terms, this increase amounts to about 4.6% of total revenues from user charges and fees. Other types of user charges (replacement contributions, administrative fees, and use and maintenance fees, fines) do not display particular patterns. Only the subaccount “third-party refunds” increases slightly. This subaccount reflects, among other flows, the payroll deductions for social insurance, which is fully aligned with the increase in personnel expenses. Municipalities enjoy much less autonomy in the definition of other sources of fiscal revenue. It is therefore no surprise that they remain largely unaffected.

Part of the adjustments on the revenue side of the current account reinforces the observed overreaction to the windfall. In addition to the increase of several current spending categories, municipalities gave tax cuts. The resulting imbalance of the current account is partially mitigated by compensating measures: decreases in some administrative and operating expenditures and increases in particular user charges. This explains why the effect on the current balance (Table 2) does not entirely mirror the expenditure increases and tax cuts.

4.2.3. Impact on investment accounts

As far as the investment flows are concerned, the windfall does not produce many relevant or significant adjustments. This is true for both administrative and non-administrative investments.¹⁵ For administrative assets, the result is not surprising given the longer decision-making process regarding municipal investments. The decision to undertake new investments is usually subject to several prerequisites (e.g., preliminary studies, financial planning, etc.). Ultimately, it can even necessitate passing the projects in a local ballot. An impact on these investments is only observed in the last treatment period. The estimated effect on the total net administrative investment (Table 2, column 5) shows a significant and large positive effect in 2016 (CHF 1.49). Yet, the analysis of the subaccounts reveals only two significant

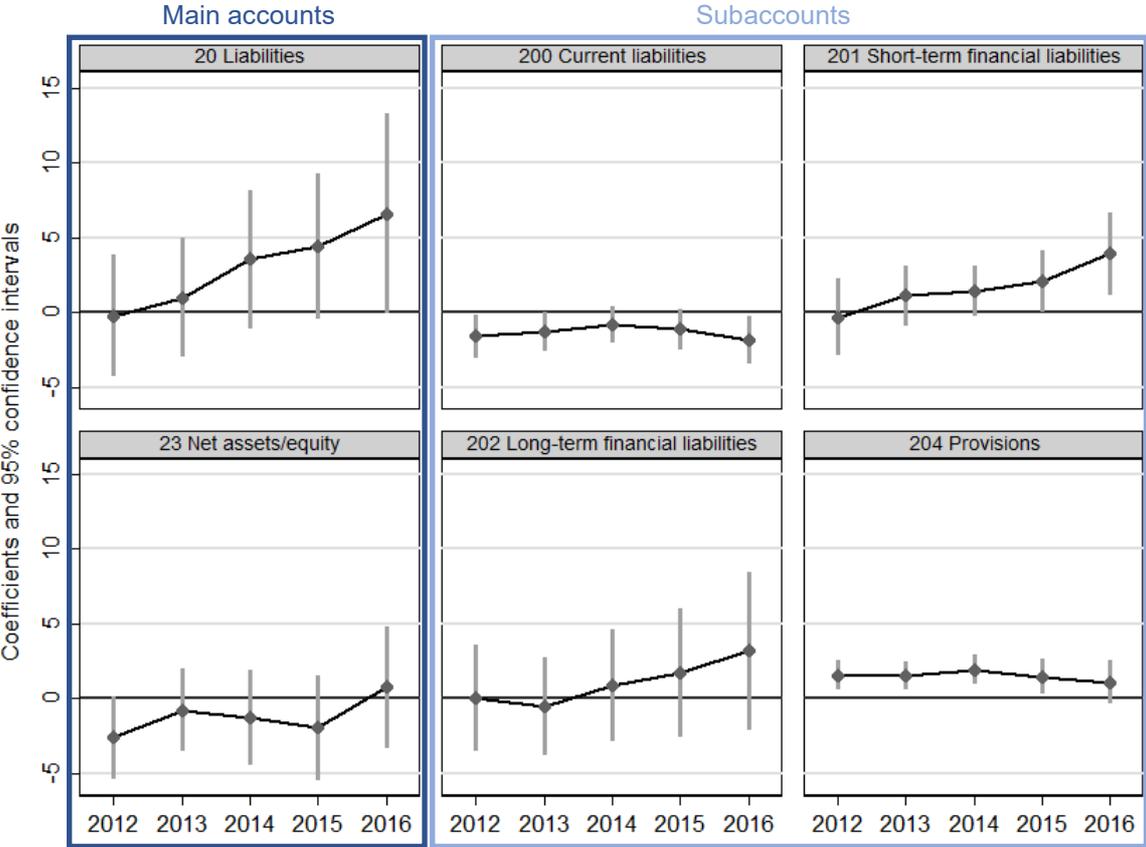
¹⁵ The accounting model of the canton of Zurich’s municipalities distinguishes investments in administrative and non-administrative assets. Administrative assets are assets necessary for the provision of public goods and services (e.g., school buildings, traffic infrastructures, etc.). Non-administrative assets serve no public purpose. They can be sold without affecting public goods provision (e.g., real estate properties serving commercial purposes, participations in private companies, etc.).

adjustments:¹⁶ A persistent small increase (about CHF 0.05) in investment subsidies to private institutions (e.g., cultural institutions, sports facilities, etc.), and a slightly larger positive effect on investment planning expenditures (about CHF 0.08). The few significant adjustments in the subaccounts indicate that, while the total investment tends to increase, there is no systematic uniform reaction of investment strategies among municipalities.

4.2.4. Impact on capital accounts

According to the accounting rules, the variation coming from the flow accounts must capitalize in the capital accounts. In the current account, the windfall induces higher expenditures and lower revenues, which deteriorate the current balance as well as the municipal cash flow (Table 2, column 3 and 4). In parallel, the net investment in administrative assets increases (Table 2, column 5). These adjustments affect the capital account in two ways. First, the adjustments in investment activities and in the cash flow determine the need to incur new debt. Second, the variation in the current balance capitalizes in municipal equity.¹⁷

Figure 4: Effect on the liability side of capital accounts, *main* and *subaccounts*.



¹⁶ See the results for all investment accounts in the Online Appendix OA.6.
¹⁷ See Online Appendix OA.2.

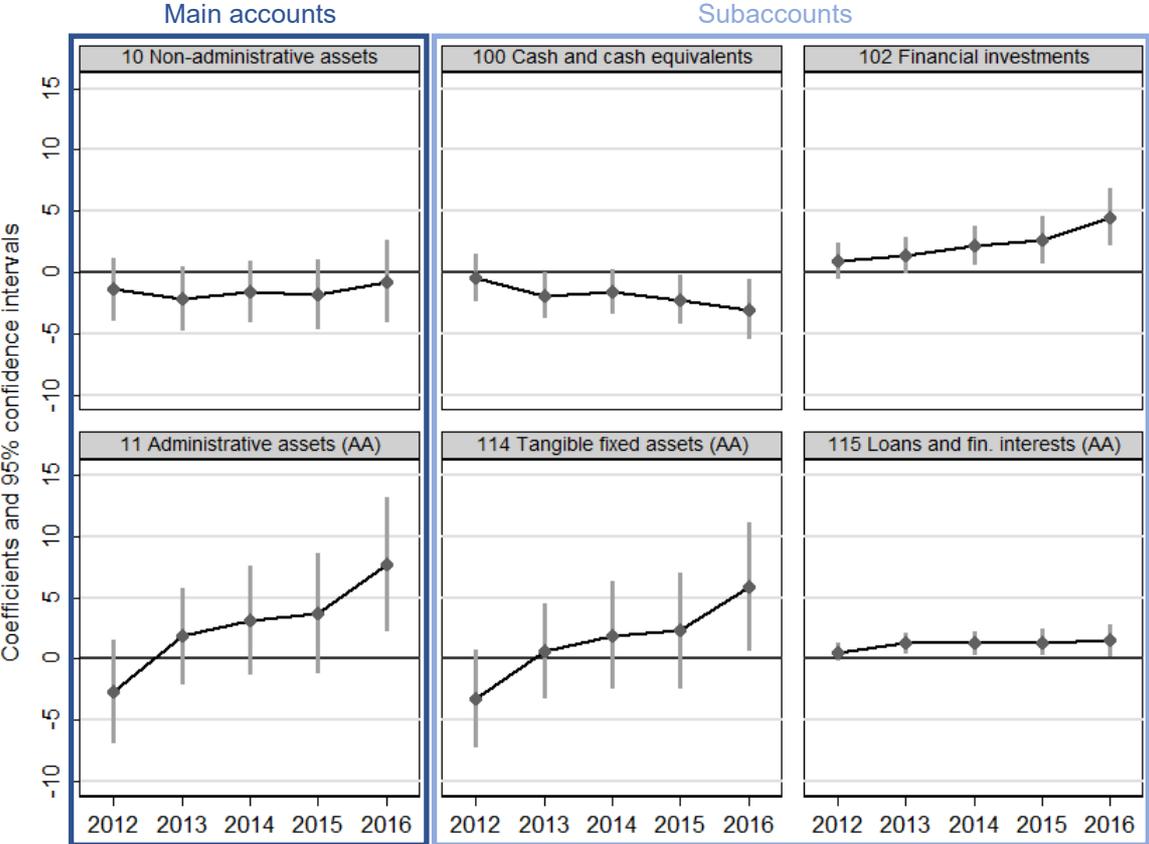
Figure 4 provides insights on how the liabilities side of the capital account is affected by the windfall. Between 2012 and 2016, total liabilities increase to CHF 6.58. This large expansion comes mostly from the accounts that compose the gross debt aggregates, i.e., short and long-term financial liabilities (CHF 3.91 and CHF 3.19, respectively), and liabilities toward other entities (CHF 0.36, not reported). The decrease in current liabilities modestly mitigates the increase in the total stock of liabilities. Our results also reveal an increase in provisions of around CHF 1. Provisions are commitments already fixed but yet unknown in their entirety. They are usually related to investment activities. The analysis of the asset side provides a potential rationale for this effect.

The liability side of the capital accounts reveals another important account: net equity. According to the accounting mechanics, the annual current balance enters the capital account in the stock of equity, i.e., a municipality's own capital. Current surpluses increase municipal equity; deficits decrease it. Between 2012 and 2016, the cumulated effect of the windfall on the current balance amounts to CHF -3.27 (Table 2). Under a strict *ceteris paribus* assumption, the estimated effect on equity should mirror the one on current balance. According to our estimations, the windfall first decreases the stock of equity, but then converges toward an effect close to zero (Figure 4). The difference between the current balance and net equity must not call into question our results. In fact, the equity account can be affected by other operations, especially accounting operations, some of which might enter the realm of creative accounting. The analysis of the rest of the capital accounts, as well as our analysis of creative accounting practices (see section 4.2.5), provides potential explanations for the difference.

The asset side of the municipal account increases by CHF 6.95 by 2016 (not reported). Figure 5 shows how this increase is spread among the different types of assets: the administrative and non-administrative assets. The effect of the windfall on the total stock of non-administrative assets is negative but statistically insignificant (Figure 5, upper left graph). The focus on subaccounts of non-administrative assets reveals some restructuring within the financial assets (upper middle). We observe a drain in the stock of liquidities (cash and cash equivalents) of up to CHF -3.04 by 2016, and an increase in financial investments (saving, shares, and loans as capital investment or real estate) of about +4.50 by 2016. Regarding administrative assets (Figure 5, lower left graph), the total stock also shows an increasing trend with a significant cumulated effect of CHF 7.69 in 2016. The trend is particularly marked in the last treatment period. The effect comes from an increase in tangible administrative assets (CHF 5.85, lower-

middle graph), which takes place in 2016. We also observe a one-time CHF 1.25 increase in loans and financial interests (lower right), but earlier in the period.

Figure 5: Effect on the asset side of capital accounts, *main* and *subaccounts*.



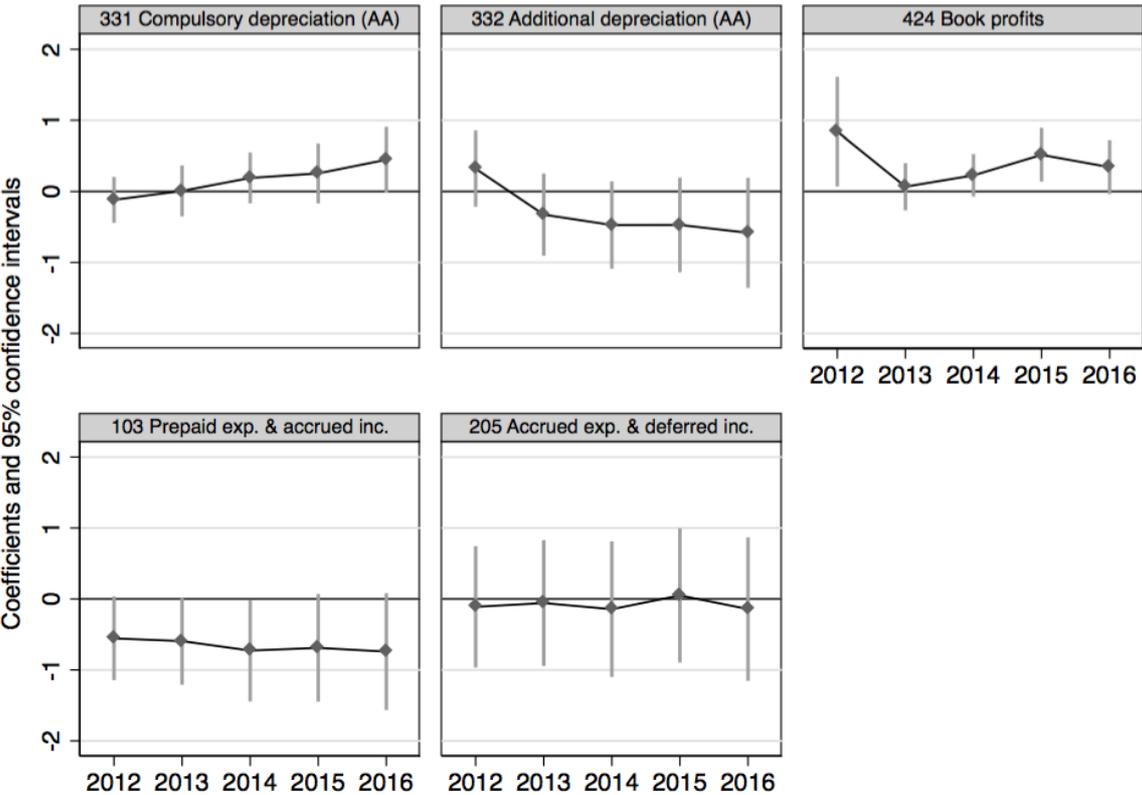
The analysis of the asset side of the capital account highlights investment activities that the variation in the investment flows only partially reveal. In total, it seems that CHF 5.74 is not explained by variations in flows. A large part of it comes from higher values of administrative assets (+5.12), the rest from the non-administrative assets (+0.63). They could explain the difference in equity, and are possibly due to the creation of provisions and “creative accounting”.

4.2.5. Traces of creative accounting?

The analysis of the capital account tends to point toward the use of “creative” forms of accounting. Some (legal) accounting manipulations might allow municipalities to hide partially the imbalances produced by the windfall. Re-evaluation of assets increases municipal equity. Other accounting operations can affect the balance of the current account. We review three commonly known accounting tricks (lower accounting depreciations, higher benefits on sale of assets, and variations in accruals and deferrals of assets and liabilities).

Depreciations are monetary expenditures when they correspond to a reimbursement of a debt. They correspond to pure accounting operations when they only represent the decline in value of an asset. Higher accounting depreciations reduce the current balance, while lower depreciations increase it. In Figure 6 (upper left and upper middle) observe an insignificant but growing trend in compulsory depreciation that reflect the increase in the stock of administrative assets. More interestingly, depreciation of non-administrative assets and additional depreciation are decreasing, but the estimated coefficients are not statistically significant.

Figure 6: Traces of creative accounting?



Municipalities can buy and sell administrative assets. They can also transfer administrative assets to non-administrative assets, and vice versa. This type of operation sometimes implies value corrections. For instance, when an asset is sold, its book value might not correspond to the purchasing value. The account “book profit”, on the revenue side of the current account, supports such differences. In the case of a sale, the profit of a sale of assets is an actual benefit that matches the inflow of liquidities. However, when assets change from administrative to non-administrative, the amount that enters the current account is a pure accounting value. Nonetheless, the operation increases the revenue side and the balance of the current account. It

can be neutralized for the current account if an equivalent value is entered in additional depreciation. Our estimations report traces of such increasing accounting benefits on assets values.

Our results show several significant positive effects on the account “Book profits” (Figure 6, upper right). We observe statistically significant coefficients in 2012 (CHF 0.84), 2015 (CHF 0.52), and 2016 (CHF 0.34). Interestingly, the origin of these effects remains unclear as an actual sale of assets should be reflected on the revenue side of the investment accounts. In 2012, we estimate a slightly larger, but insignificant coefficient in non-administrative sales. The increase in profits observed in 2012 could be related to that. However, the non-administrative assets do not show traces of a reduced stock (Figure 5). Also, the effects observed on profits find no balancing effects that could make accounting benefits neutral to the current balance; for instance, on the account’s additional depreciation (Figure 6). Overall, “Book profits” contribute to mitigating the negative effects of the windfall on the current balance. Nonetheless, it is impossible to conclude firmly that creative accounting practices have been used systematically by municipalities.

Last but not least, accruals and deferrals of assets and liabilities might provide another opportunity to influence temporarily the current balance. As it is in private accounting, these two capital account positions permit reporting revenues and expenses in the economically relevant period, no matter when the cash receipt or payment actually occurs. Accruals and deferrals reallocate revenues and expenses across time and can serve different accounting strategies and potentially allow smoothing of the current balance.

Our estimations on the accruals and deferrals of *liabilities* find no significant effect and a coefficient close to zero (Figure 6). However, for accruals and deferrals of *assets*, our results show a significant negative effect of CHF -0.56 in 2012, which becomes slightly larger over time. We cannot distinguish whether the negative effect comes from lower accrual revenues or lower deferral expenses. However, the implication for the current balance is the same: it reallocates parts of the current surplus of 2012 to 2013, and similar for the other years. For example, this adjustment implies that the estimated effect on the 2012 current balance is overstated (reducing deficits), while the effect on the 2013 current balance, when the windfall enters, is understated, etc.

4.2.6. Summary of the results

Many of the documented effects would have gone unnoticed without the use of econometric methods and an exploration of the detailed, disaggregated accounting positions. Our empirical analyses show that municipalities strongly respond to the windfall. Traces of the windfall are observed in all main accounts. The investment accounts appear to be least affected. In the current and capital accounts, the windfall triggers large adjustments in current expenditures and revenues, and induces large effects on assets and liabilities. Some adjustments are temporary, but many persist over time and capitalize in the stock accounts.

Palliating to the imbalances, municipalities adopt compensation measures. Some drawdowns increase and some spending categories slightly decrease over time. The windfall induces a restructuration of many accounting categories. The analysis also documents some traces of creative accounting practices. Several observed effects seem to serve the purpose of improving key accounting aggregates, such as the current balance or municipal equity.

More specifically: We document massive increases in public expenditures going more than 6-fold beyond the size of the windfall. Most of this adjustment comes from persistent increases of personnel expenses targeting the administrative staff, a temporary increase in operating expenses, and persistent increases in subsidies to local public entities and private individuals. On the revenue side, we observe a persistent reduction in income tax revenues, accompanied by a persistent increase in user charges for nursing home services and smaller ones for school fees. These policy changes cause a deterioration of the current balance and lead to the accumulation of substantial public debt in the order of magnitude of about 7.5 times the windfall and other shifts in the capital accounts.

4.3. Robustness checks

To underpin our empirical results, we conduct a series of robustness checks. First, we check whether or not our results are solely driven by some influential observation or specific groups of municipalities. This does not seem to be the case. Secondly, a major advantage of accounting information is that the estimated effects on accounts and subaccounts must add up according to some well-specified rules. All of our results conform to these rules. Thirdly, given the large number of regressions, we need to worry about problems of multiple hypothesis testing. Our results remain significant, even after adjusting the standard errors for false discovery rates. Fourthly, we also present results (for the available main accounting categories) using a longer horizon, which allows us to include municipality-specific time trends, and, finally, we run

placebo tests on pre-treatment periods, and evaluate pre-treatment trends. None of these robustness checks challenge our main insights. The specific result tables and graphs are reported in the Online Appendix OA.3.

4.3.1. Influential observations and effect heterogeneity

To make sure that our results are not primarily driven by some influential observation or driven by a particular group of observations, we run a series of robustness checks. First, for each outcome variable, we run regressions excluding one observation at a time and report the coefficients with the largest difference to our previous results using the full sample. Table OA.2 of the Online Appendix reports the results including the smallest as well as the largest estimated windfall coefficient in 2013 for our main outcome variables. The differences are small and our qualitative results are unaffected. This assessment holds for the effects of the windfall for other years and other outcome variables (not reported).

Secondly, we consider the relative position of a municipality in the equalization scheme. One of the two decisive parameters in the equalization scheme is the local per capita tax capacity of a municipality evaluated against the average tax capacity per capita in the canton. We run regressions distinguishing the effect of the windfall between richer municipalities (defined as those municipalities above the equalization cut-off of 110% of average tax capacity and contributing less to the equalization scheme), and poorer municipalities (defined as those situating below the equalization cut-off of 95% of average tax capacity and receiving higher transfers). In general, the effects are very similar, point in the same direction, and are not significantly different from each other at the 5% level (a summary of important results are reported in the Online Appendix Figure OA.4). However, the effect of the windfall on depreciations, subsidies, and user charges show some noteworthy (though generally insignificant) differences: The effects of the windfall tend to be larger for the richer municipalities.

Thirdly, the population size is the other decisive parameter of the resource equalization scheme. We distinguish between municipalities above and below 10'000 inhabitants.¹⁸ The effects are very similar, point in the same direction, and the differences are in general not statistically significant. However, a larger (but mostly insignificant) difference can be observed for the effect on personnel expenses and tax revenues (Online Appendix Figure OA.5). As a reaction

¹⁸ A total of 26 municipalities situate above the population threshold of 10'000 inhabitants. This threshold is also applied by authorities to grant the status of a city in Switzerland and it typically separates the more urban from the more rural towns.

to the windfall, smaller municipalities reduce their taxes by about CHF 1.2 per 1 CHF of windfall, while larger municipalities reduce it by only about CHF 0.6. Personnel expenses increase somewhat more strongly in smaller municipalities. The largest difference of the two effects occurs in the effect in 2014, in which personnel expenses increase by about CHF 1 per CHF 1 in windfall in larger municipalities, while smaller ones only increase it by about CHF 0.4.

4.3.2. Accounting identities and mechanical impact

Our estimations respect the accounting identities and rules. First, all coefficients add up according to accounting rules. The estimated coefficients for the main accounting categories correspond to the sum of the coefficients of their sub-accounts. Similarly, the estimated effects on the large aggregates match the sum of the individual effects on the components of the aggregates.

Second, the accounting rules imply that the windfall has a *mechanical* impact on two specific accounts. The resource equalization transfers enter into specific municipal accounts the moment they are effectively received or paid. Municipalities that experienced an increase in equalization transfers due to the windfall (132 municipalities) received the transfer in the subaccount “equalization transfers received” on the revenue side of the current accounts. Those municipalities that pay less than expected find their windfall in a reduced outflow in the “equalization transfers paid” account on the expenditure side of the current accounts (23 municipalities). If our windfall variable correctly measures the windfall, we should be able to observe its mechanical impact on the respective accounts and find a 1-to-1 relationship between the windfall variable and the outcome.

We regress the windfall measure and the relevant control variables on the above-mentioned accounts (Online Appendix Table OA.3). We obtain close to a 1-to-1 relationship (0.919 and -0.927). Both estimated coefficients are statistically significant. This further indicates that our windfall measure isolates the part of the equalization transfers that is due to the Glencore windfall.

4.3.3. Multiple hypothesis testing

Given that we run regressions on many dependent variables, we conduct multiple hypothesis tests to control for false discovery rates (FDR). We follow the procedure of sharpened two-stage q -values described in Anderson (2008) and introduced in Benjamini, Krieger, and Yekutieli (2006). The tests indicate that our main results are not merely type I errors.

Concerning the current accounts, the effects on personnel expenses, subsidies to own companies, and regular taxes are significant when controlling for FDR at $q = 0.10$. The same is true for the compensation effects found in the subaccounts of user charges. Regarding the outcomes from the capital accounts, the increase in provisions, in non-administrative assets (financial investments) and in administrative assets (Loans and financial interests) are also significant at $q = 0.10$. The impact on the stocks of liquidities, prepaid expenses and accrued income, and current liabilities only closely miss the threshold.

4.3.4. Longer timeframe and municipal time trends

The most disaggregated accounting data, including subaccounts, are only available since 2008. However, the available data for the main accounting categories actually cover a longer period. We replicate our estimations, adding eight additional fiscal years, and obtain very similar results for a timeframe going from 2000 to 2016 (Online Appendix Figure OA.6).

The extension of the timeframe also allows for introducing municipality-specific time trends. Even though the introduction of such trends is extremely restrictive and the estimated coefficients flatten, the main qualitative insights hold (Online Appendix Figure OA.7). We observe general level effects from the municipality-specific de-trending, but, the relative dynamics persist. The de-trending of such a short period of time, in which all the variation in the explanatory variable happens toward the end of the period, can be expected to produce such level effects. We still observe the relative changes in the accounts when the windfall enters the decision-making process and hits the municipalities.

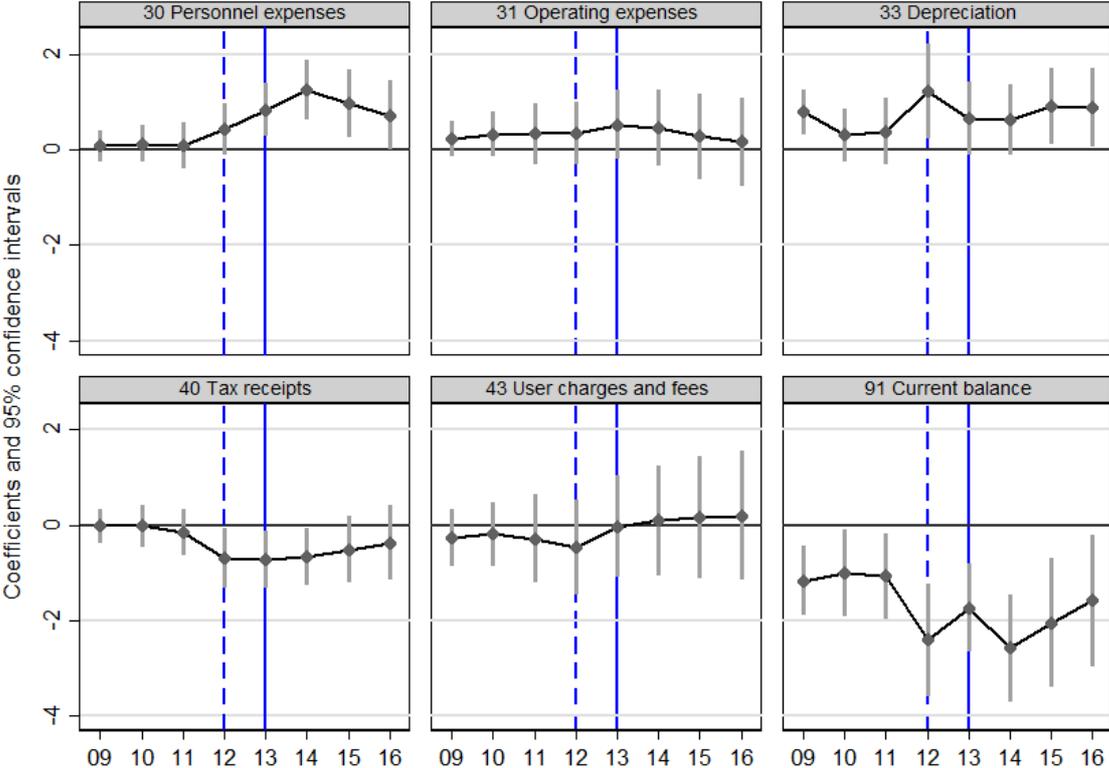
4.3.5. No pre-treatment effects

The extension of the timeframe allows us to evaluate the existence of pre-treatment trends. The placebo tests consist of simulating the windfall for earlier (placebo) periods. We expect the windfall to show no significant pre-trends on the outcomes in periods before 2012. Based on the extended dataset, we introduce three additional leads in our specification and estimate the impact of the windfall for the placebo periods 2009, 2010, and 2011.

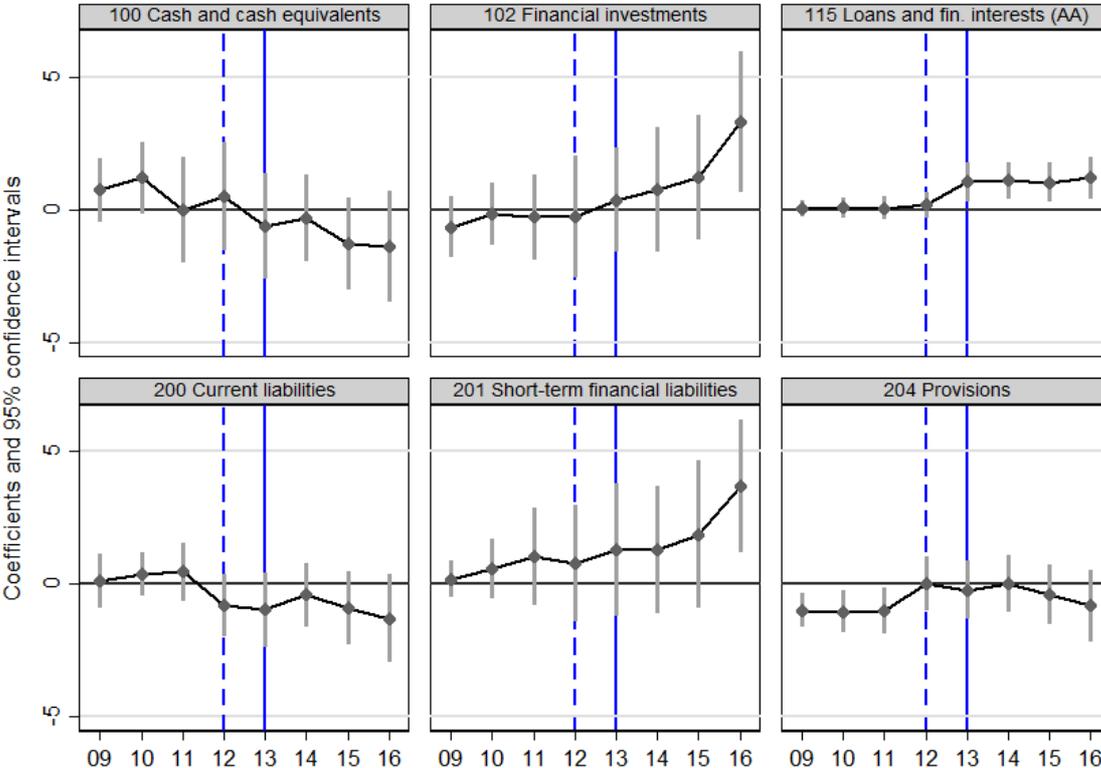
As expected, the results in Figure 7 do not show important pre-trends. Note that there are some significant differences in levels between those that receive a higher and those that receive a smaller windfall. However, no important pre-trends are visible and thus, our identifying assumption of similar pre-treatment trends remains valid. The results mitigate concerns that our results are merely driven by other factors than the windfall itself.

Figure 7: Placebo tests and pre-treatment trends.

Panel A: Current accounts



Panel B: Capital accounts



Note: The blue lines represent the payment of the windfall transfers in 2013, the blue broken lines represent the announcement of the windfall in early 2012.

5. Interpretations

Our empirical results are difficult to reconcile with standard public economic theory. Normative theories relying on the permanent income hypothesis or similar can, in equilibrium, accommodate incremental increases in current expenditures and revenues and, in the short run, somewhat larger increases in infrastructure expenditures, while most of the windfall would be saved (e.g., Barro, 1979; van der Ploeg & Venables, 2011). Our large and permanent increases in current expenditures, the restructuring of current revenues, and the increase in public debt are no equilibrium outcomes. Likewise, according to the flypaper effect, intergovernmental grants can increase the marginal propensity to spend on public goods (e.g., Henderson, 1968; Gramlich, 1969), but such theories cannot explain the restructuring and the overall size of the adjustments in our setup.

Given the result patterns, we believe that a politico-economic interpretation is more likely: politicians want to appeal to the electorate and provide rents to special interests. In line with such an interpretation, the main results show that the windfall benefited taxpayers through tax cuts and special interests (foremost local public employees) through increases in current expenditures.

In the context of the municipalities in the canton of Zurich, two qualifications pertaining to local policymaking have to be discussed. First, electoral competition is often rather unimportant. In some municipalities it is notoriously hard to find enough candidates. Therefore, winning elections might not be a very strong motivation. However, politicians face their voters on a regular basis in municipal assemblies and it remains important to cater to the electorate at large to pass policy in municipal assemblies. Among other topics, the local tax shifter is regularly discussed in citizen assemblies and it requires approval by the municipal assembly or by the local parliament. In line with anecdotal evidence, it is likely that pressure for tax cuts came directly from the citizens in local assemblies.

Second, local governments are led by elected part-time policymakers and managed primarily by a local administrator and its staff. Local administrators hold—*de facto*—very strong positions, as they run the municipality on a daily basis and are best acquainted with local circumstances. Local politicians depend heavily on their information and assistance. From this perspective, local employees are very well organized and have a certain clout over one-off resources.

In Online Appendix OA.4 and OA.5 we provide evidence that these intuitions hold more generally when considering *all* accounting outcomes. For this analysis, we categorize all flow accounts with respect to who they affect and whether or not information on these accounts are available through local media (for details see Table OA.5). Specifically, we code all subaccounts on whether changes in them affect a large or a small group, if the affected groups are likely to be organized or not, whether or not the media report on the specific accounts, and if transactions in these accounts are easily perceptible by the affected individuals (see Online Appendix OA.4 and OA.5). Our empirical results indicate that benefits are concentrated in accounts affecting small and organized groups on which the media tend not to report (Figure OA.8, upper middle). The large and unorganized group of taxpayers benefits through tax cuts that the media cover extensively (Figure OA.8, upper left), but are harmed through the induced imbalances leading to, for example, higher interest payments and other transactions that remain below the radar of the media and which are not easily perceptible (Figure OA.8 upper right and lower left).

Other interpretations seem less likely: One view holds that voters might have had a biased perception of the windfall. While the media reported extensively on the total amount of the extraordinary tax revenue from Mr. Glasenberg (CHF 360 million), the specific implications for each municipality were much less covered. If voters overestimated the actual windfall received by their local municipality, overspending of the windfall could temporarily occur. However, the persistence of the observed changes would require that voters also misperceive the windfall's temporary nature. Given the significant media coverage and the intense public discourse following the Glencore windfall, we do not believe that this was likely. The permanent adjustments in current expenditures and revenues would require additional assumptions. These could be some form of loss aversion by voters, voter inertia, or forms of mental accounting (e.g., Hines & Thaler, 1995; Lago-Peñas, 2008), where once granted favors are difficult to take back.

Another view proposes the creation of a political endowment effect: once the fiscal policy adjustments resulting from the windfall are chosen by the majority, they become the new status quo, and a majority of voters would want to stick with it (Alesina & Passarelli, 2015). Apart from the general tax reductions that might align with the median voter, we would have to assume further that the windfall induced voters to tilt public expenditures toward small and narrowly defined groups (local administrative staff), and to target other groups with higher fees

(e.g., nursing home fees). Without further assumptions, our results seem inconsistent with such a model.

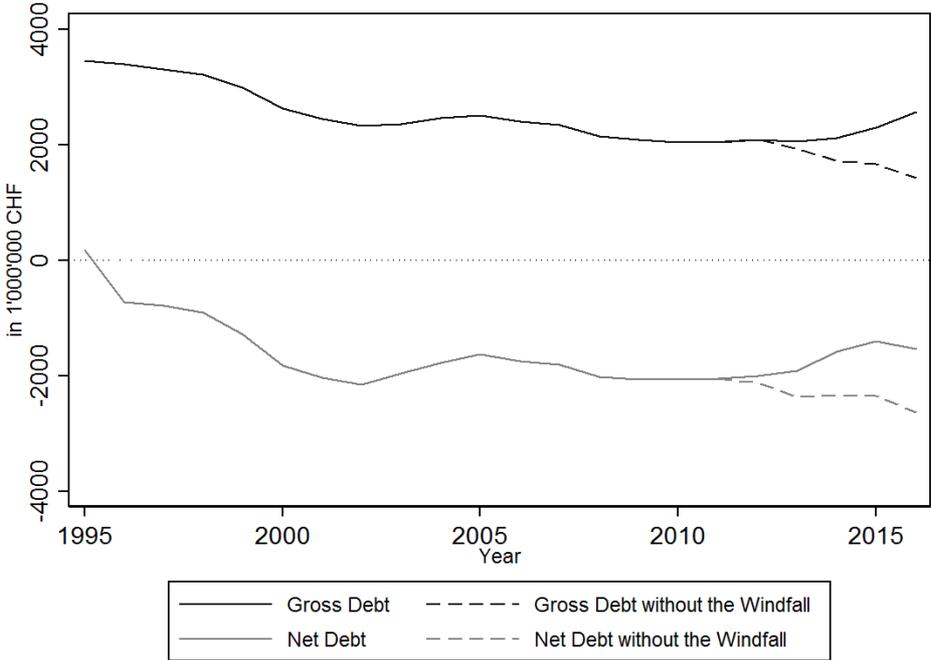
6. Open questions

At this point, at least three important questions come to mind: First, do local political institutions, such as local democracy in the form of citizens' assemblies and compulsory fiscal referenda, or local political factors, such as political parties and female politicians, affect the observed patterns of the windfall? Our preliminary analyses do not suggest large heterogeneities in the reaction of different municipalities to the windfall. Neither economic or demographic, nor institutional or political differences substantially affect our overall results. Further research addresses these questions.

Second, how can municipalities absorb such increases in public debt? Do they have problems in accessing external financing? It is important to remember that our estimates control for the underlying economic situation and municipal fixed effects, and that increases in public debt are relative to the counterfactual situation without the windfall. In this particular period, municipalities of the canton of Zurich experienced stable conditions and economically prosperous years. The levels of public debt and the exploitation of the tax base were on average moderate to low. Municipalities had (and still have) easy access to bank loans at interest rates close to zero and the few larger cities that issue public debt on capital markets (e.g., the city of Zurich) feature extremely low yields.¹⁹ As documented in Figure 8, gross and net municipal debt were on a declining trend for most of the 15 previous years and net debt was largely negative, i.e., non-administrative assets were higher than the stock of liabilities. Figure 8 documents the stabilization and then the reversion of that trend in 2013. The broken lines provide the counterfactual trends in gross and net debt without the windfall. In this environment the increases in public debt could be absorbed quite easily and we are not aware of serious discussions about unsustainable patterns in the evolution of local public debt.

¹⁹ We do not have access to systematic data on interest rates on bank loans. However, according to the association of Swiss municipalities ("Schweizerischer Gemeindeverband") interest rates for 10-year bank loans can be obtained for rates below 1% and anecdotal evidence suggests interest rates as low as 0 to 0.5% in 2016. Examples from the cities of Zurich or Winterthur suggest successful placements of municipal bonds with coupons as low as 0.15%.

Figure 8: Trends in municipal gross and net debt, 1995 – 2016



Third, and maybe most important, why do we observe these unsustainable patterns in the reaction to the windfall, while we do not observe overall imbalances or unsustainable patterns in general public finances in the canton of Zurich? Or, put differently, if politicians overspend and redirect resources in response to the windfall, why don't they do it also with regular revenue flows and are, hence, in financial difficulty?

Let us mention at the outset that we can only speculate on this question. Our narrative is based on anecdotal evidence and we are unable to test our conjectures empirically. In normal times, without large shocks, local public finances are the results of a bargaining process. The local political process aggregates and weights local preferences, which results in a certain political equilibrium. Without shocks, this equilibrium remains relatively stable. Political shifts among interest groups would cause redistribution and be met with resistance of the concerned interests. Therefore, politicians can fend off new demands by pointing to the redistributive character and consequences of accepting specific demands and deviations from the political consensus.

However, in times with a highly mediated positive one-off windfall, resources are up to be distributed and interest groups are mobilized. For example, we have observed the unusual demand of Christian interest groups to redistribute resources to beneficiaries outside the municipality: five municipalities held popular ballots or decided in municipal assemblies on whether or not to donate some of the windfall to charities targeting countries, in which Glencore

was active. Even though only minimal sums were finally donated,²⁰ it generated significant media attention and might have made all interest groups aware of the extra-money to be distributed.

Strategies to fend off demands on redistributive grounds are, not credible because the windfall delivers additional resources to be distributed and new demands do not directly hurt established interests. As a consequence, politicians have difficulty to fend off such demands and engage in overpromising. They might allocate highly visible and mediated benefits to taxpayers through tax cuts, and accommodate special interests with transfers where it is least visible. Such patterns would be well in line with our empirical results.

Given that the windfall was not of enormous magnitude (about 3% of current expenditures), implementing policy responses remaining below the referendum thresholds was not difficult. The large imbalances only built up over time due to the discrepancy of the persistent nature of some responses and the one-off nature of the windfall. So far, there was, to our knowledge, no awareness of the induced imbalances in the media or in the cantonal administration overseeing local municipalities. This is not entirely surprising, as the consequences are not obvious when looking at the numerous public accounts without detailed data and econometric methods. From this perspective, political strategies according to our narrative would not have caused obvious negative consequences. Moreover, similar to a rising tide who lifts all boats, yardstick competition—the comparison with neighboring municipalities—might not have had its usual effect, because basically all municipalities benefited from this one-off windfall.

7. Conclusion

We investigate how municipalities of the canton of Zurich adjust their fiscal behavior in response to a temporary fiscal windfall. The windfall itself is exogenous to local public finances. It has its origin in the IPO of Glencore at the London Stock Exchange. As a result, its CEO, Ivan Glasenberg, paid a large extraordinary income tax bill to its residential municipality of Rüslikon and the canton of Zurich. Most of this extra tax revenue was redistributed to other municipalities of the canton through the municipal fiscal equalization scheme. We document the surprising fact that this one-off windfall induced large and persistent imbalances

²⁰ Five municipalities in the region of the Knonauer Amt decided to donate 10% of the windfall to Swiss charities active in countries in which Glencore extracted natural resources (e.g., Hotz, 2013b).

to local public finances in a developed country like Switzerland with a reputation for strong democratic institutions: hence the fiscal windfall curse.

Based on our detailed accounting data, we estimate the causal effect of the relaxation of the municipal budget constraint on local public finances: The windfall induced increases in personnel expenses, administrative and operating expenses, and subsidies, and a decrease in revenues from income taxes, as well as an increase in revenues from user charges. The fiscal response in the current account by far exceeds the size of the windfall. It deteriorates persistently the current balance and, over 4 years, increases the stock of gross debt in an order of magnitude of about 7.5 times the windfall. A rough calculation illustrates the overall effect: the CHF 154 million fiscal windfall considered in our analyses induced the accumulation of about CHF 1.1 billion in total gross debt.²¹ This points to a massive fiscal windfall curse.

We ran a series of robustness checks: all estimated coefficients sum-up according to accounting rules, the necessary mechanical effects are observed where expected, our results survive tests addressing multiple hypothesis testing, we do not observe pre-trends in placebo-regressions, and effect heterogeneity is small.

These results are difficult to reconcile with standard public economic theory. In an explorative empirical analysis, we show that the observed patterns of the impact of the windfall are well in line with a simple politico-economic interpretation: Policy makers use the windfall to further their political interests: they want to appeal to the electorate and target political favors to specific interest groups. They provide highly mediatized and perceptible benefits to the general public (most notably and most visibly, income tax cuts). They also provide specific favors to small and powerful interest groups as long as the recipients immediately perceive the benefits and public awareness through media coverage remains low. Examples of such strategies are the increase in personnel expenses, subsidies to local public entities, and to private individuals. The costs of the politically motivated use of the windfall are concentrated in accounts in which consequences for individual voters are blurred: they affect all inhabitants in general, and the effect on individual voters is unspecific and not immediately perceptible (e.g., deficits or depreciations).

Our findings relate to the large literature analyzing the impact of natural resource windfalls (e.g., Hodler, 2006; Bhattacharyya & Hodler, 2010; van der Ploeg, 2011; Caselli & Michaels, 2013; Borge et al., 2015). According to this literature, natural resource windfalls can cause a

²¹ We exclude Rüslikon, the cities of Zurich and Winterthur, and 6 municipalities involved in an amalgamation.

resource curse. In contrast to the more permanent natural resource windfalls in developing countries, (often) with weak political institutions, the one in our analysis is only temporary and embedded in a high-quality institutional environment. Despite these facts, our results document traces of a “curse.”

One important question is how it is possible that a one-off windfall can induce such imbalances, while local public finances are on a sustainable path in general. In other words, why do we not observe unsustainable patterns also with regular revenue flows? We argue that the highly mediatized shock temporarily affected the politico-economic equilibrium and mobilized special interests. Given that the windfall provided additional resources, politicians might have found it difficult to fend off new demands on grounds that giving in to these demands had a direct redistributive effect on other groups. Finally, policymakers were giving highly visible tax cuts to local taxpayers and targeted special interests with rents where media attention was low.

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Appendix

Table A1: Summary statistics of main accounts and control variables (2008-2016).

	Obs.	Mean (std. dev.)	Min	Max
<i>Main outcome variables: main accounts, in CHF</i>				
30 Personnel expenses	1458	9'079'094 (12'631'607)	335'011	90'047'704
31 Operating expenses	1458	6'933'436 (8'431'378)	403'389	55'197'977
36 Subsidies	1458	9'922'005 (13'086'832)	245'337	88'184'170
40 Tax receipts	1458	21'447'016 (26'722'504)	617'201	165'692'593
43 User charges and fees	1458	8'247'316 (12'610'860)	178'510	67'032'082
91 Current balance	1458	704'772 (3'399'085)	-28'236'428	29'627'691
10 Non-administrative assets	1458	36'744'131 (40'122'983)	2'145'171	244'084'844
11 Administrative assets (AA)	1458	20'669'898 (26'175'344)	347'998	193'247'911
20 Liabilities	1458	24'087'475 (30'027'952)	207'496	169'655'414
23 Net assets/equity	1458	27'859'798 (32'331'836)	0	226'567'941
<i>Main control variables</i>				
Regular equalization transfers, in CHF	1458	868'170 (11'164'682)	-96'853'145	41'756'879
Population	1458	5'486 (5'774)	297	34'216
% young population (<20 years)	1458	21.82 (2.24)	14.11	28.88
% aged population (>65 years)	1458	16.05 (3.07)	8.00	26.20
Unemployment rate, in %	1458	1.99 (0.73)	0.21	4.85
Tax capacity, in CHF	1458	19'550'359 (26'283'668)	487'379	189'363'289
Property gain tax, in CHF	1458	1'860'985 (3'137'201)	-53'205	37'530'872