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Fiscal Windfall Curse

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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. In contrast to much of the literature of resource windfalls, the windfall occurred in a stable democracy with strong fiscal institutions. It 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, permanent expenditure increases targeting specific groups (mostly public employees) at the same time as general tax cuts and user charge hikes. 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, even with strong fiscal institutions.

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

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

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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 and Michaels 2013; Borge, Parmer, and 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. The windfall did not change any structural parameters: the shock was transitory and conditionally exogenous 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 Rüschlikon 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 Rüschlikon. 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 permanent structural changes in local economic circumstances affecting 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 accounts and 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.

We document 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. The increase in public debt, starting in 2013, reversed an overall declining trend in municipal debt that happened over the 15 previous years. The increase in gross debt could be absorbed fairly easily, as municipalities, on average, featured large negative net debt (i.e., non-administrative assets > 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 during 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 and Venables 2011; Cherif and 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 at large 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, and Rubinfeld 1979; Turnbull 1992; Hines and Thaler 1995; Bailey and Connolly 1998; Inman 2009; Vegh and Vuletin 2015; Allers and

Vermeulen 2016; Leduc and 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 analyzes discoveries of substantial natural resources or natural resource price booms and provides evidence that such resource windfalls can cause a resource curse, especially in countries with weak democratic institutions. Such countries tend to save and invest too little, feature lower levels of economic growth, suffer more from corruption, regional favoritism, political rent-extraction and low-quality politicians, and have a higher likelihood of conflict (e.g., Gylfason 2001; Sachs and Warner 2001; Hodler 2006; Bhattacharyya and Hodler 2010; van der Ploeg 2011; Brollo et al. 2013; Caselli and Michaels 2013; Hodler and Raschky 2014; Borge, Parmer, and Torvik 2015; Caselli, Morelli, and Rohner 2015; Robinson, Torvik, and Verdier 2017). 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 it can occur even within a framework of strong fiscal institutions.

The rest of the article is structured as follows: 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. Sections 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 Rüschlikon (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 in the fiscal year 2011 (Hotz 2013a), of which about CHF 160 million went to the municipality of Rüschlikon (e.g., Baumann 2012; Schraner 2012).[1]

Out of the CHF 160 million local income tax revenue paid to the municipality of Rüschlikon, 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, 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 previous 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, population and tax multiplier. In general, richer municipalities redistribute resources to poorer ones, but the rule does not require that the total transfers to poorer municipalities correspond to the total contribution payed by the richer ones. Resulting differences are financed by the canton. The transfers are unconditional.

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[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).

The municipality-specific transfers (positive for poorer municipalities, negative for richer municipalities) are calculated on a yearly basis. The key parameter is the municipal tax capacity per capita that measures the municipal tax base. It is 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 and 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 Rüschlikon's tax capacity in 2011 increased the cantonal average tax capacity and, thus, produced an exogenous shift, which 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 modifying the equalization parameters as if the Glencore shock did not hit Rüschlikon, and recalculate accordingly the entire equalization scheme. The parameter that shocked the equalization scheme in 2013 is the one-off variation in Rüschlikon's tax capacity per capita in 2011. It increased form 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 was never 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

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[3] Besides Mr. Glasenberg, other members of the top management team reside in the canton of Zurich and even Rüschlikon (Schraner 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 Rüschlikon. Therefore, extra tax payments of other individuals residing in Rüschlikon 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.

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

Our approximation appears 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 Rüschlikon'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 comes very close to the estimated CHF 160 million published by local newspapers (Baumann 2012; Hotz 2013a). Using an alternative 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 prediction is well in line with the estimated 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, 96). Ultimately, our calculation of the total windfall amounts to CHF 238.2 million, which includes the extra contributions of Rüschlikon (CHF 135.8 million) as well as the canton (CHF 102.4 million).

We exclude the directly affected municipality of Rüschlikon 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 zero in all years but 2013 and it is positive or zero for all municipalities in 2013. 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 Rüschlikon'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 on average. 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.
All municipalities				
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
Beneficiaries				
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
Contributors				
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 Rüschlikon, 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 on 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 very solid and 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 at interest rates close to zero. 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 and Kirchgässner 2001; Schelker and 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 elected (*ad personam*) 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 elected (*ad personam*) local citizens. They audit the budget and the accounts, evaluate (and criticize) spending propositions, and they issue a report and they can make amendment propositions in municipal assembly meetings (see Schelker and 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 in the municipal assembly.

Local elections were held in 2014. Most municipalities only elect the local executive (and members of specific commissions such as the finance commission), 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. 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.

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[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.

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 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 the 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. Empirical strategy and identification

The Glencore windfall produced a *temporary* relaxation of the municipal budget constraint in 2013. Given that we focus on the relaxation of a budget constraint, the quantity of interest is also expressed in budgetary terms, and thus in CHF. Intuitively, policy makers decide over the financing of public goods and do so in "purchasing power" terms (and not in per capita terms or other). As the budget constraint is relaxed by a certain amount, it is natural to expect a reaction proportional to this relaxation. Hence, we expect an additive rather than multiplicative relationship between the windfall and a potential fiscal reaction, which speaks for a level rather than a log specification. Therefore, we specify our regression models in absolute values (in CHF) and not as ratios (per capita values) or logs (elasticities). Moreover, there are econometric reasons backing a specification in absolute values rather than ratios or log specifications. First, specifications relying on ratios can produce spurious correlations, as is well known in the statistical literature (Neyman 1952; Kronmal 1993). Secondly, the windfall measure is zero in the years without a windfall (other than 2013), for which the log is undefined.

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[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 Rüschlikon, 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.

3.2.1. Timing

The windfall entered the municipal accounts in 2013, but its origin is anterior to the effective equalization transfers and related political decisions. 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 information about the estimated impact of Glencore's flotation on Rüschlikon and the potential implication for the equalization scheme already in early 2012. The first newspaper report on the issue that we found was published on February 7th, 2012 (Schraner 2012). It is possible that the municipal executives received preliminary information about potential implications for the equalization transfers even somewhat before that date, but clearly only after the actual IPO in May 2011. As a result, municipalities were 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.

3.2.2. Identification

Resource equalization transfers are determined by the municipal tax capacity per capita relative to the cantonal average, and scaled by the municipal population size and the tax multiplier (recipients only), all in $t - 2$.[7] First, by construction, the change in equalization transfers (windfall) is driven by the increase in the cantonal average tax capacity per capita, which is entirely due to the IPO of Glencore and the related one-off increase in the tax capacity of Rüschlikon. Glencore's IPO in 2011 and, thus, the respective inflow of tax revenues into the equalization scheme is exogenous to local public finances in 2011. The equalization rule specifies different formulas for recipients and contributors, and leaves municipalities in between the two relevant equalization thresholds unaffected (neutrals). Moreover, the shock induces some municipalities to switch from being neutral to becoming recipients or to become neutrals from being contributors. Overall, more than 10 percent of the observations belong to the latter groups. Second, all parameters of the equalization scheme are determined two years before the actual payment of equalization transfers in 2013 and about one year before the first information on the windfall were published. We believe, it is safe to argue that all relevant parameters are determined prior to any possible decision-making related to the use of the windfall. Hence, from the perspective of policymakers, the parameters underlying the windfall are determined exogenously.

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

Our identification hinges primarily on the exogeneity of the increase in Rüschlikon's tax capacity and a standard conditional independence assumption (e.g., Wooldridge 2002) for the counterfactual resource equalization transfers, which would have affected the budget constraint in a foreseeable and correlated way without the Glencore effect. The identifying variation depends on the *additional* exogenous equalization transfers (Windfall in CHF) received in 2013 due to the Glencore IPO in 2011, while holding constant *regular* (counterfactual) equalization transfers. To make sure that size effects beyond the equalization rule (depending on $t-2$) are absorbed, we control for contemporaneous population size and the tax capacity.

In our robustness section, we estimate effects separately for different groups of municipalities related to their status of either *receiving more* or *paying less* and to the size of the municipality. Both robustness exercises do not reveal important effect heterogeneity.

3.2.3. Reform of the equalization scheme and the vertical allocation of task

It is important to note that an additional complication must be considered: First, 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 making 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 the entire period, which make the data comparable over the time. We observe all actual transfer flows before and after the reform and are able to capture all relevant changes to the municipal budget constraint. As a result, our estimations include the sum of all equalization transfers, excluding the windfall in 2013. Conditional on controlling for these flows, identification is assured.

Secondly, in the same overall context, there was a reform of the vertical allocation of tasks between the canton and the municipalities in 2012. The reform aimed at disentangling some financial flows between the canton and its municipalities related to the (joint) production of public goods and services. These changes are very well documented and impact municipalities primarily through transfer flows (Regierungsrat des Kantons Zürich 2016). We fully observe

these changes and they only affect a limited number of accounting outcomes.[8] As a result, we control for the municipal compensations and subsidies with counterparts to and from the canton, and 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 entire period. Appendix Table A1 presents the descriptive statistics of the major accounts (outcome variables) and of our main control variables. Fully comparable data is available also for the pre-reform period before 2012.

3.2.4. Specification of the regression model

We are interested in the causal effect of the fiscal windfall in 2013 on local public finances. This consists of estimating where the windfall spreads in municipal accounts, i.e., which accounts are affected by the windfall and by how much. 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).

For transparency reasons, we provide *all* regression results on *all* relevant accounting outcomes in the Online Appendix. Disaggregating accounting data to trace effects in more detail in all subaccounts, comes with a multiple testing problem. Traditional procedures based on, for example, Bonferroni inequalities adjust rejections levels by dividing the α for Type-1 errors by the number of tested hypotheses (for an overview, see Shaffer 1995). In our case, the number of hypotheses tested scales up to a very large number. Not only do we estimate and test 5 to 6 coefficients per outcome (main effect with lags and leads), but we trace the impact of the windfall on a great number of outcomes, namely all accounts and subaccounts. Traditional methods, such as the familywise error rate (FWER), are extremely conservative approaches (Benjamini, Krieger, and Yekutieli 2006) and there is no way we could fulfill the requirements for hypothesis testing according to these methods. In contrast, newer methods such as the false discovery rate (FDR) proposed by Benjamini and Hochberg (1995) control for the expected proportion of falsely rejected Null-hypotheses. We use the updated method proposed by Benjamini, Krieger, and Yekutieli (2006) and implemented in Anderson (2008). For all regression outcomes we present the appropriate FDRs in either the regression tables or the graphical representations.

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

However, we feel that it is important to note that our approach does not hunt for statistically significant results. We document the impact of the windfall on the universe of relevant accounting measures and report *all* of these outcomes in the Online Appendix. In the paper we present results that are not primarily statistically significant but economically relevant (McCloskey and Ziliak 1996) and we follow the manifesto by the American Statistical Association (Wasserstein and Lazar 2016; Wasserstein, Schirm, and Lazar 2019) and the group of more than 800 scientists who "rise up against statistical significance" in a Nature comment with that online title in 2019 (Amrhein, Greenland, and McShane 2019). In line with these suggestions we do not want to overly emphasize statistical significance, but provide a full and transparent picture of estimated coefficients.

The regression specification is the following:

$$Y_{it}^j = \alpha + \sum_{\tau=-3}^{\tau=1} \beta_\tau Windfall_{i,t+\tau} + \vartheta Equalization\ transfers_{it} + X_{it}\theta + \vartheta_i + \mu_t + \epsilon_{it},$$

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.[9]

The variable $Windfall$ measures the intensity of 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 β_1 (2014), β_2 (2015), and β_3 (2016). 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 in 2013) equalization transfer. Controlling for regular equalization transfers is necessary for the identification of the windfall effect, because they are based on the same rule as the windfall (by construction). As discussed in the previous section 3.2.3., our measure includes the resource

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[9] 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.

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 want to alleviate concerns about a series of other factors that might affect annual variations in fiscal policy outcomes, given the differences in municipal characteristics: 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 immovable 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 (Berset, Huber, and Schelker 2020). 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 overall fit and we want to make sure that such revenue fluctuations are captured in our regressions. Third, we control for potential effects due to the reform of the vertical allocation of tasks, which changed some transfer flows to and from municipalities. Specifically, we include municipal compensations and subsidies with counterparts to and from the canton, and municipal compensations and subsidies to and from other municipalities and associations of municipalities.

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 subaccounts. Third, and more technically, total current revenues and expenditures include the windfall, as it enters the current revenues for the municipalities receiving higher transfers and the current expenditures 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 based on our specification discussed in section 3.2.4.[10] The first five outcomes are measures of accounting flows, whereas gross and net debt are accounting stocks. In order to provide transparency regarding the multiple hypothesis testing problem, we provide the false discovery rates (FDR) considering that we run seven regressions on the aggregated account categories with five relevant parameters (β_{-1} to β_3) per regression. Overall, the interpretation of the results remains fairly unaffected when based on false discovery rates (FDR) rather than traditional statistical significance. Statistically significant results at the 5 percent level in terms of p-values remain significant at the 10 percent level (or only barely miss this threshold) in terms of q-values.

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 documents that the total current revenues increase in 2012 and 2013, but that this increase is typically not statistically significant. 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, transitory and typically insignificant adjustments to the total current revenues, the windfall negatively affects the current balance (column 3), as well as the cash flow (column 4).[11] 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,[12] and CHF 7.13 on net debt.[13]

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[10] In Online Appendix OA.3 we present the results on the same outcomes when implementing a very sparse model, only including regular transfers, the population size and the tax capacity as covariates, as discussed in the section on identification. Some of the effects become stronger due to the omission of the covariates controlling for changes in transfers between municipalities and the canton (see section 3.2.3 on the reform of task allocation between canton and municipalities in 2012).

[11] Cash flow = current balance – depreciations. The cash flow is also known as "self-financing."

[12] Gross debt = short-term debt + medium-term debt + long-term debt + commitments toward other entities.

[13] Net debt = total stock of liabilities – non-administrative assets.

Table 2: Impact on accounting aggregates.

	(1) Current expend.	(2) Current revenue	(3) Current balance	(4) Cash flow	(5) Net investment	(6) Gross debt	(7) Net debt
Windfall$_{2012}$	2.245***	0.805	-0.945**	-0.600	0.327	-0.0956	0.794
(β_{-1})	(0.526)	(0.622)	(0.414)	(0.449)	(0.497)	(2.035)	(1.752)
	[0.002]	[0.298]	[0.089]	[0.289]	[0.569]	[0.786]	[0.629]
Windfall$_{2013}$	1.877***	0.824*	-0.586	-0.985**	0.196	0.818	2.984
(β_0)	(0.493)	(0.490)	(0.529)	(0.485)	(0.425)	(2.164)	(2.043)
	[0.003]	[0.178]	[0.369]	[0.105]	[0.629]	[0.677]	[0.233]
Windfall$_{2014}$	2.032***	0.148	-1.204**	-1.657***	0.0873	2.551	4.975**
(β_1)	(0.500)	(0.540)	(0.514)	(0.501)	(0.478)	(2.456)	(2.151)
	[0.002]	[0.695]	[0.089]	[0.01]	[0.709]	[0.399]	[0.089]
Windfall$_{2015}$	1.264**	-0.166	-0.595	-0.913*	0.477	4.076	6.167**
(β_2)	(0.611)	(0.626)	(0.588)	(0.549)	(0.516)	(2.736)	(2.451)
	[0.105]	[0.695]	[0.399]	[0.178]	[0.43]	[0.233]	[0.087]
Windfall$_{2016}$	0.150	-0.369	0.0615	-0.176	1.489*	7.454**	7.130**
(β_3)	(0.659)	(0.790)	(0.730)	(0.705)	(0.798)	(3.651)	(3.035)
	[0.695]	[0.629]	[0.783]	[0.695]	[0.146]	[0.105]	[0.089]
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

Note: Standard errors are clustered at the municipality level and are reported in parentheses.
* p < 0.10, ** p < 0.05, *** p < 0.01. False discovery rates [q-values] are reported in brackets.

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, we run our regression model on *all* outcomes reported in the relevant accounts and subaccounts.[14] In the following series of graphs, we report a selection of estimated coefficients and the associated 95% confidence intervals as well as q-values of our calculation of false discovery rates (Benjamini, Krieger, and Yekutieli 2006) in brackets. We report results that are economically relevant (e.g., McCloskey and Ziliak 1996; Amrhein, Greenland, and McShane 2019) and we do not primarily focus on statistical significance. For reasons of transparency and to alleviate concerns related to "p-hacking", we report the regression results on *all* outcomes in the Online Appendix OA.7 and calculate false discovery rates based on all outcomes in the

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

accounts and subaccounts *per account category*: current expenditures, current revenues, investment expenditures, investment revenues, liabilities, and assets.

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. We report the results of *all* regressions in the Online Appendix OA.7. As can be observed there, most other coefficients (not reported below) are very close to zero.

Figure 1: Effects on current expenditure, *main accounts*.
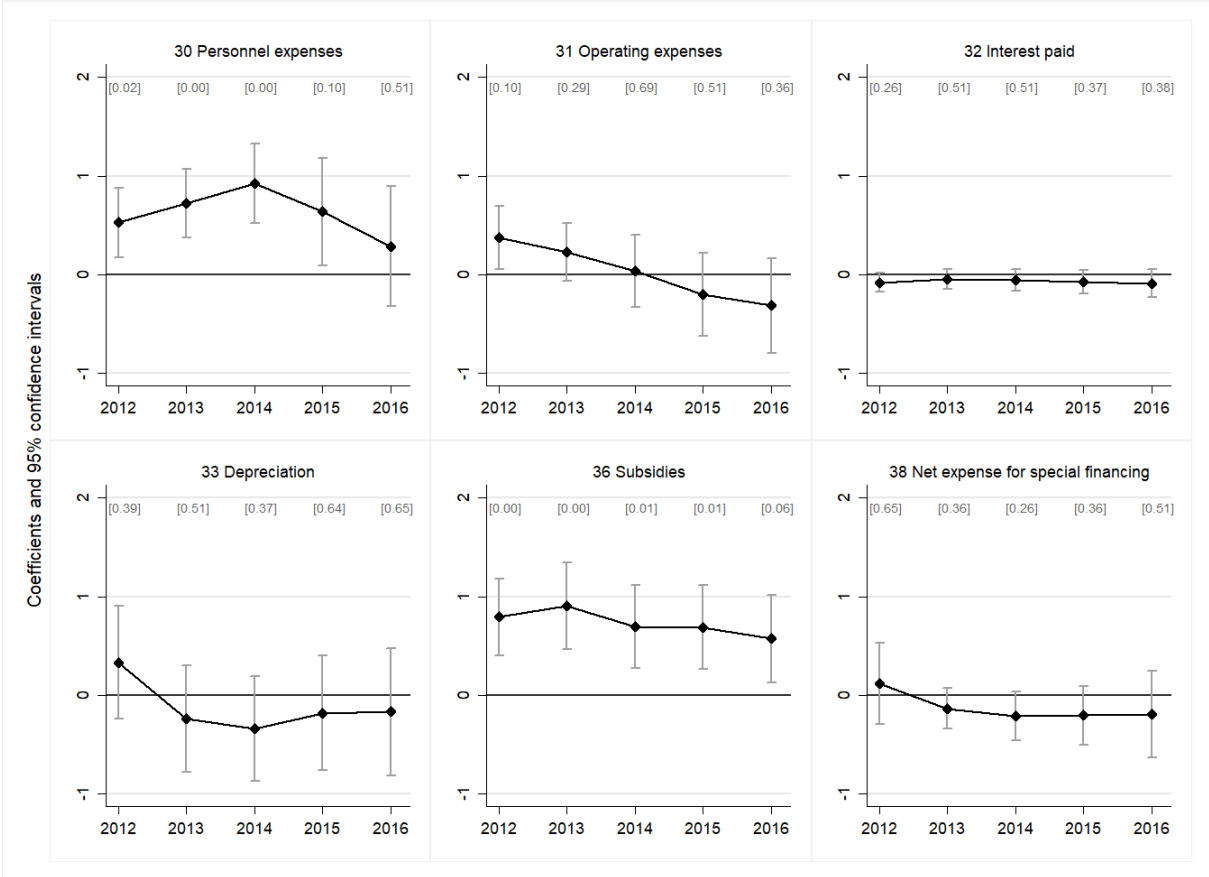
Note: The graphs depict the estimated coefficients and the respective 95%-confidence interval as well as false discovery rates [q-values] in brackets.

When focusing on effect size, the windfall affects mainly three accounts (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*.
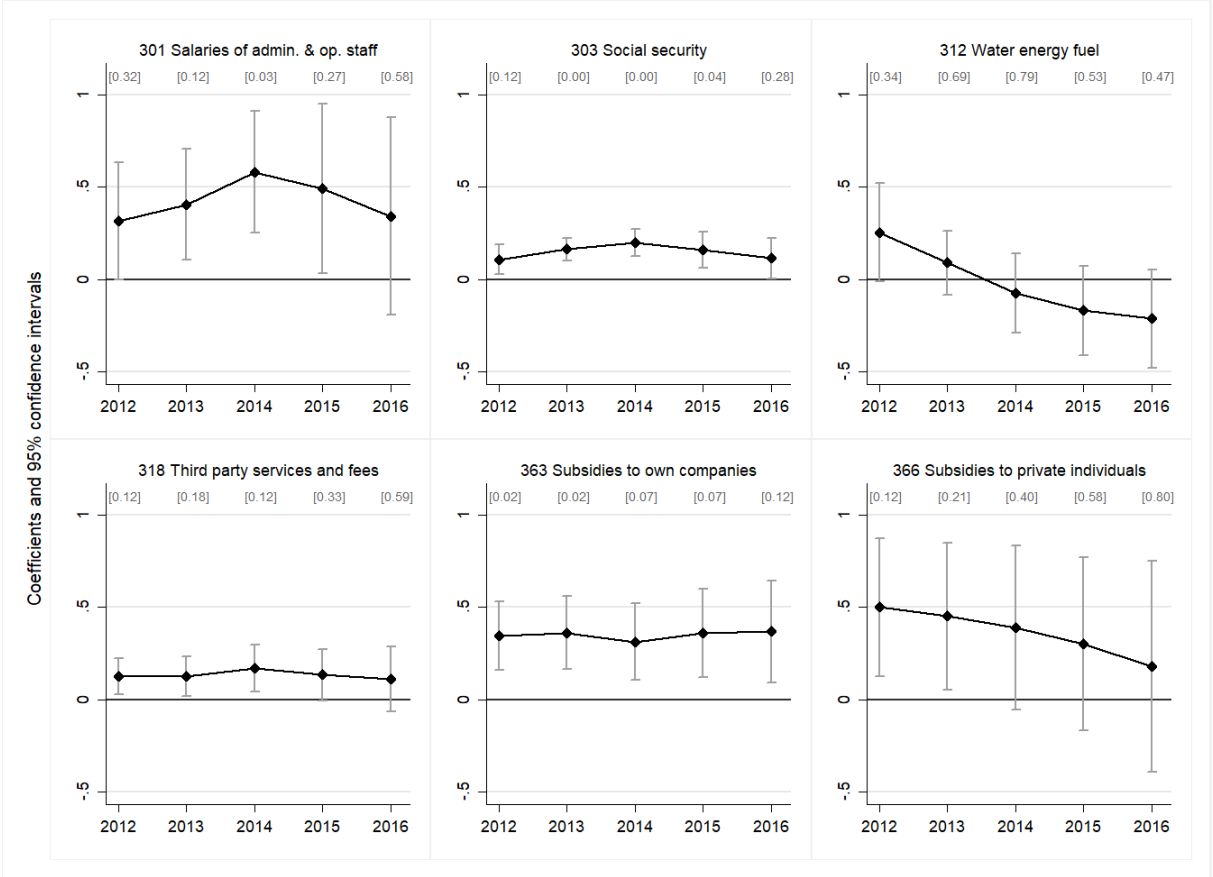
Note: The graphs depict the estimated coefficients and the respective 95%-confidence interval as well as false discovery rates [q-values] in brackets.

The sizable overall effect on personnel expenses stems primarily 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 (reported in the Online Appendix OA.7). 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 these mechanisms. On a smaller scale, temporary

compensations and in-kind benefits experience temporary increases (reported in the Online Appendix OA.7). 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 some restructuration 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 companies[15] (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 already in the current expenditure category. Considering only the significant estimates of the expenditure-side of the current account, a CHF 1 windfall induced—

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[15] "Own" public companies are companies, establishments, or institutions owned by the municipality, or with governing bodies directly appointed by local authorities.

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 and more nuanced picture and shows compensating effects in different accounts. 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.

Figure 3: Effect on current revenue, *main* and *subaccounts*.
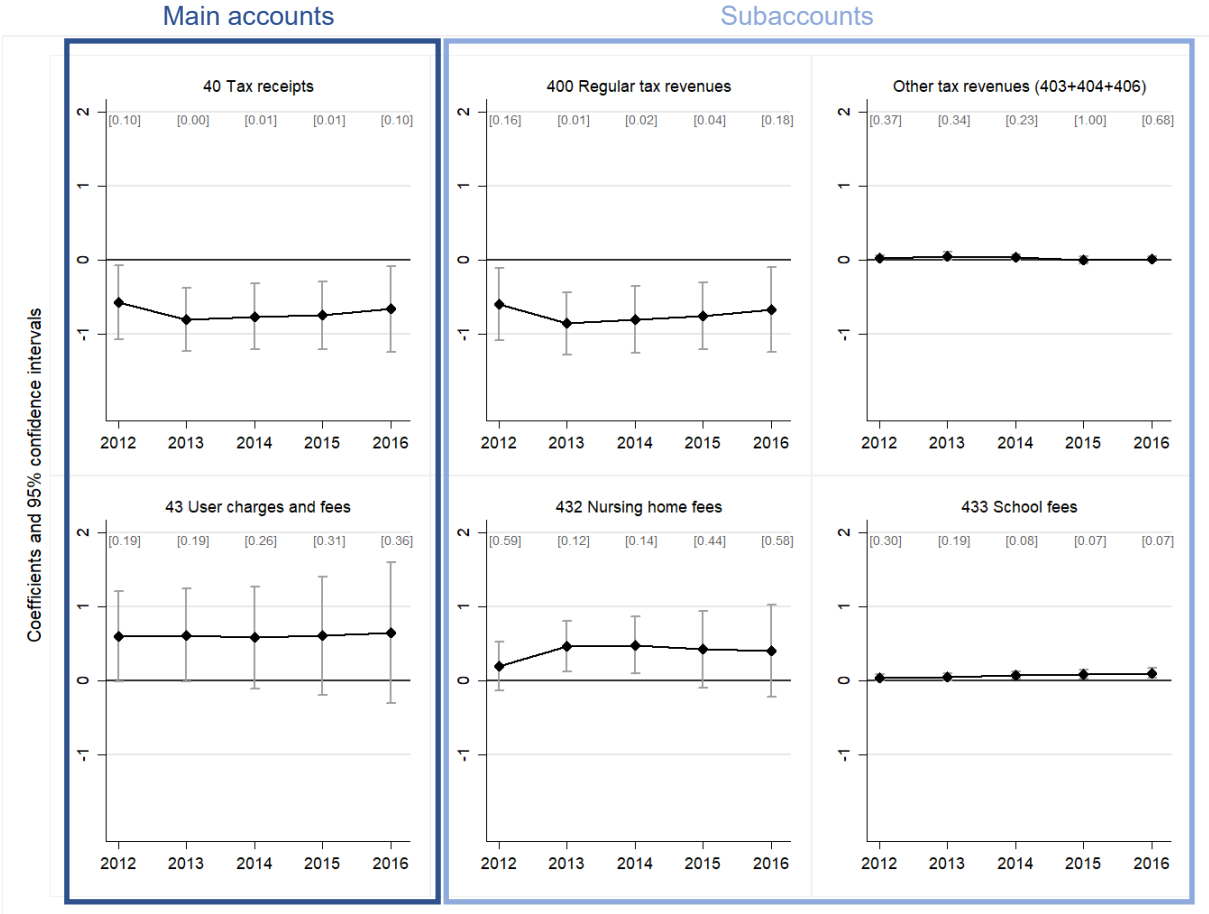
Note: The graphs depict the estimated coefficients and the respective 95%-confidence interval as well as false discovery rates [q-values] in brackets.

The three upper graphs of Figure 3 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.

Even though the precision of the estimates is much lower and traditional levels of statistical significance are not reached, the point estimates show permanent increases in user charges (Figure 3, lower left), which are in stark contrast to the permanent tax reductions. As accounting data has to sum up according to accounting rules (and so do coefficients), the small and insignificant effects on total current revenues documented in Table 2 are driven by these two diverging forces.

The size of the effect on user charges and fees is slightly smaller than the overall effect on taxes and it 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 form 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 (see Online Appendix OA.7). 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 not surprising and fully consistent 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.[16] 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 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 adjustments:[17] 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 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.[18]

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, reported in OA.7). 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.

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[16] 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.).

[17] See the results for all investment accounts in the Online Appendix OA.7.

[18] See Online Appendix OA.2.

They are usually related to investment activities. The analysis of the asset side provides a potential rationale for this effect.

Figure 4: Effect on the liability side of capital accounts, *main* and *subaccounts*.
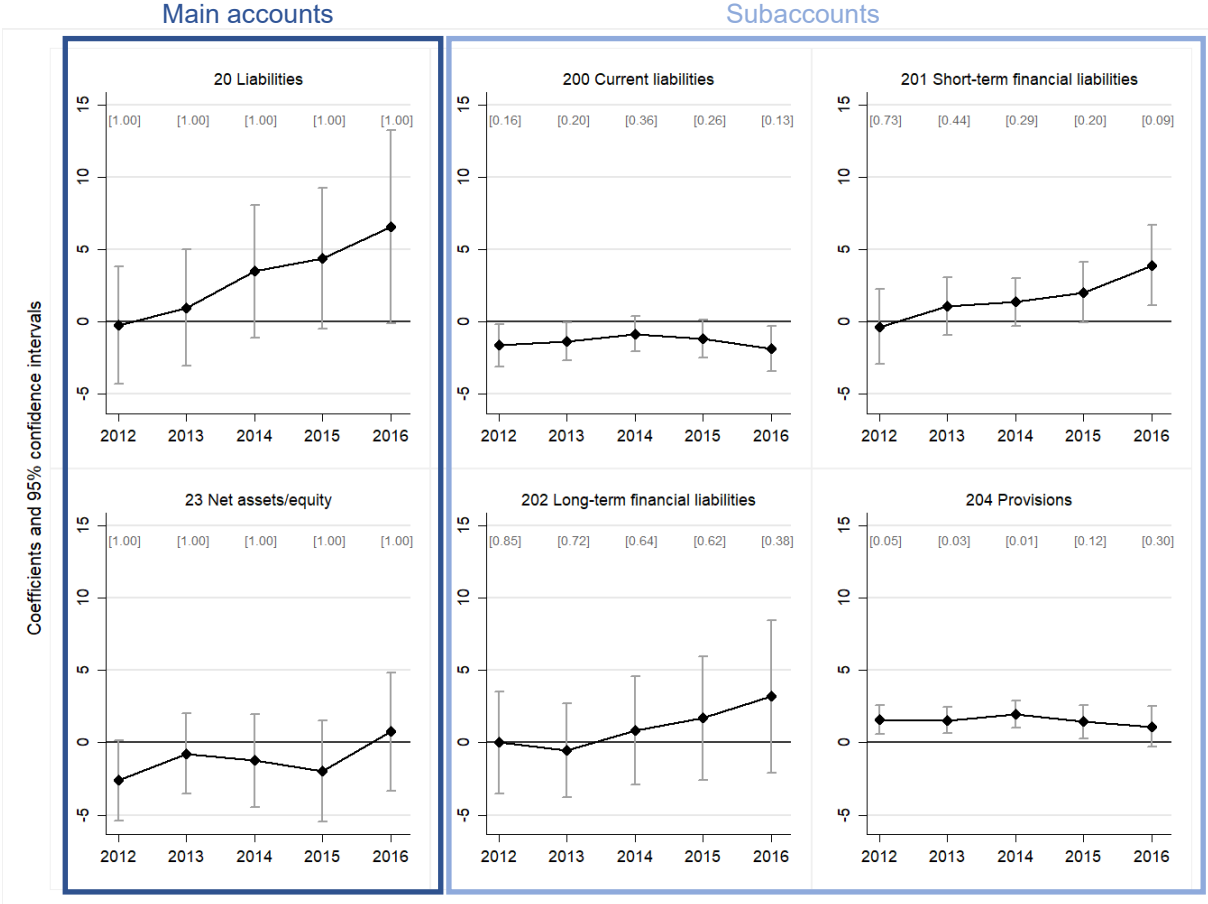
Note: The graphs depict the estimated coefficients and the respective 95%-confidence interval as well as false discovery rates [q-values] in brackets.

Note that most of the estimated coefficients are insignificant. This is true for the traditional concept of statistical significance as well as according to the q-values of our false discovery rate analysis. However, we believe that the analysis nevertheless points to interesting insights: First, the estimated coefficients *must* sum up according to accounting rules and most other coefficients on the remaining outcomes (only reported in the Online Appendix) are close to zero. Even though the underlying variation of the reaction across municipalities seem to be substantial, it is not the case that there are large effects on other outcomes not reported in the main text. Secondly, as we run a great number of regressions the multiple hypothesis testing problem accentuates. Such measures are of primary importance in setups, in which we would deliberately choose to report some specific outcomes from the many possible. However, our

approach refrains from such a strategy and we report regressions on all possible outcomes in the Online Appendix. We refrain from a further discussion of these same issues in what follows.

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 (reported in OA.7). 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 not significant (Figure 5, upper left graph). The focus on subaccounts of non-administrative assets reveals some restructuration 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*.
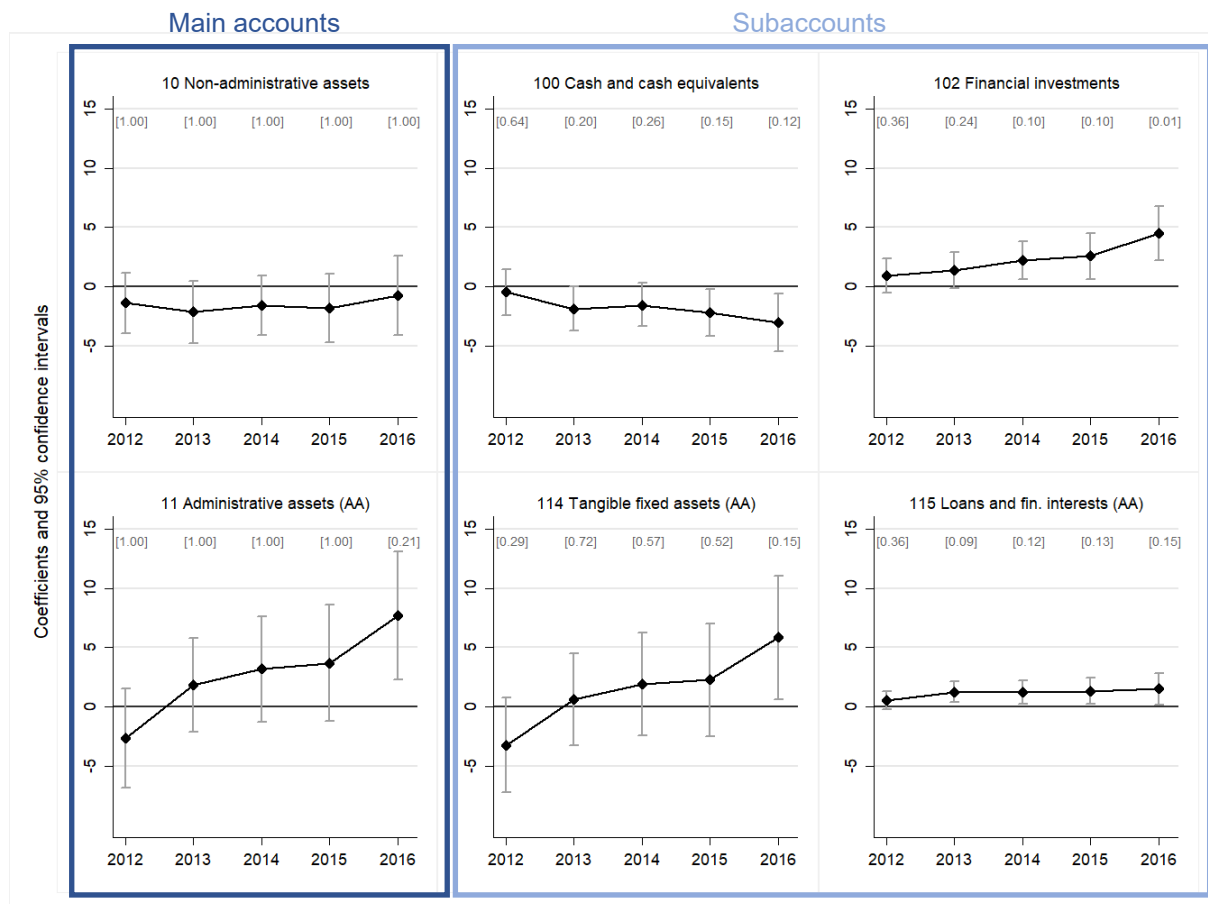

Note: The graphs depict the estimated coefficients and the respective 95%-confidence interval as well as false discovery rates [q-values] in brackets.

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?
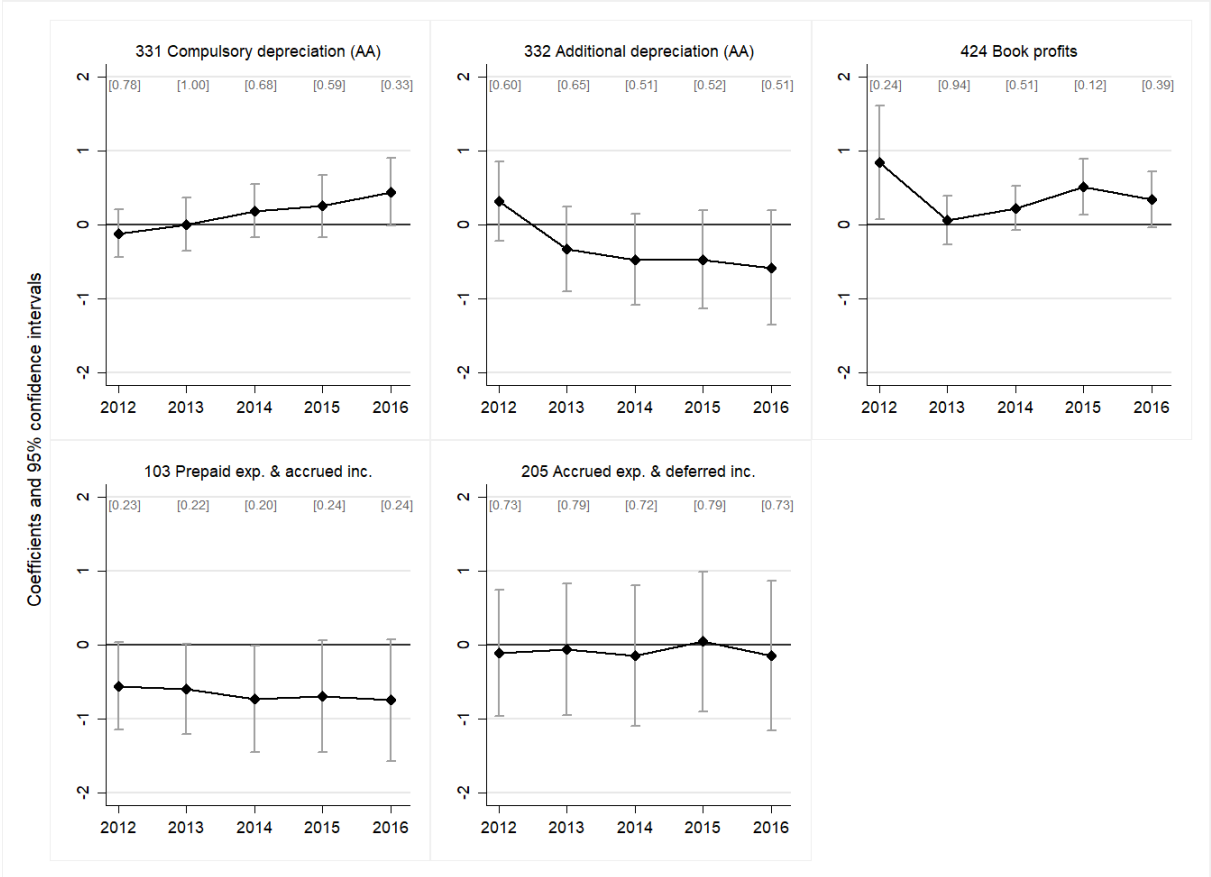
Note: The graphs depict the estimated coefficients and the respective 95%-confidence interval as well as false discovery rates [q-values] in brackets.

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 (CH 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 tests

To underpin our empirical results, we conduct a series of robustness tests. 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 accounting rules. All of our results conform to these rules. Thirdly, 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.4.

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.3 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). The effects are quite similar, point in the same direction, and are often not significantly different from each other at the 5% level (a summary of the most important results is reported in the Online Appendix Figure OA.5). However, the effect of the windfall on personnel expenditures, depreciations, subsidies, and user charges 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.[19] Again, the effects are very similar, point in the same direction, and the differences are mostly not statistically significant. However, a larger difference can be observed for the effect on personnel expenses and tax revenues (Online Appendix Figure OA.6). As a reaction to the windfall, smaller municipalities reduce their taxes by about CHF 1.25 per CHF 1 of windfall, while larger

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[19] 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.

municipalities reduce it by only about CHF 0.55. Personnel expenses increase somewhat more strongly in larger municipalities. The largest difference of the two effects occurs in the effect in 2014, in which personnel expenses increase by about CHF 0.9 per CHF 1 in windfall in larger municipalities, while smaller ones only increase it by about CHF 0.35.

4.3.2. Accounting identities and mechanical impact

Our estimations (have to) respect the accounting identities and rules. First, all coefficients must 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 largest aggregates match the sum of the individual effects on the components of these 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 on the above-mentioned accounts (Online Appendix Table OA.4). We obtain close to a 1-to-1 relationship (0.919 and -0.927). Both estimated coefficients are statistically significant also in terms of FDR's. This further indicates that our windfall measure isolates the part of the equalization transfers that is due to the Glencore windfall.

4.3.3. 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.7).

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.8). 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.

4.3.4. 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
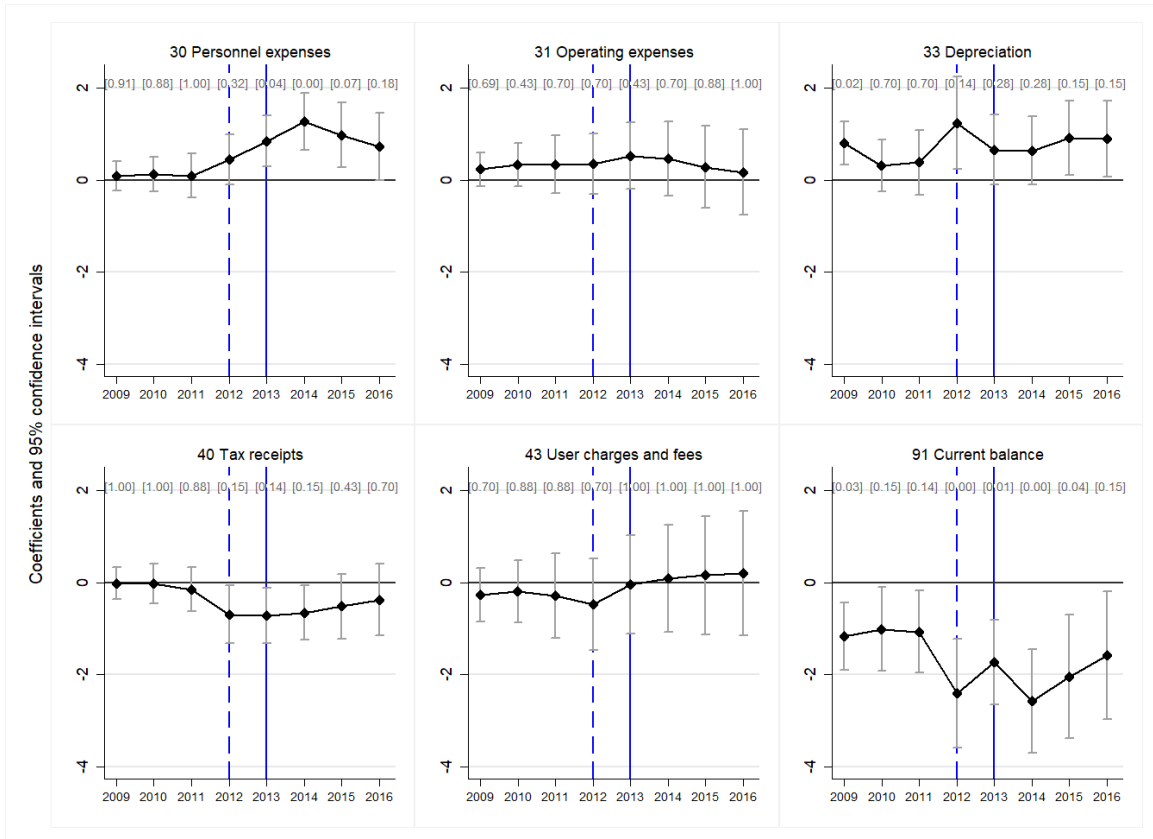
Panel B: Capital accounts
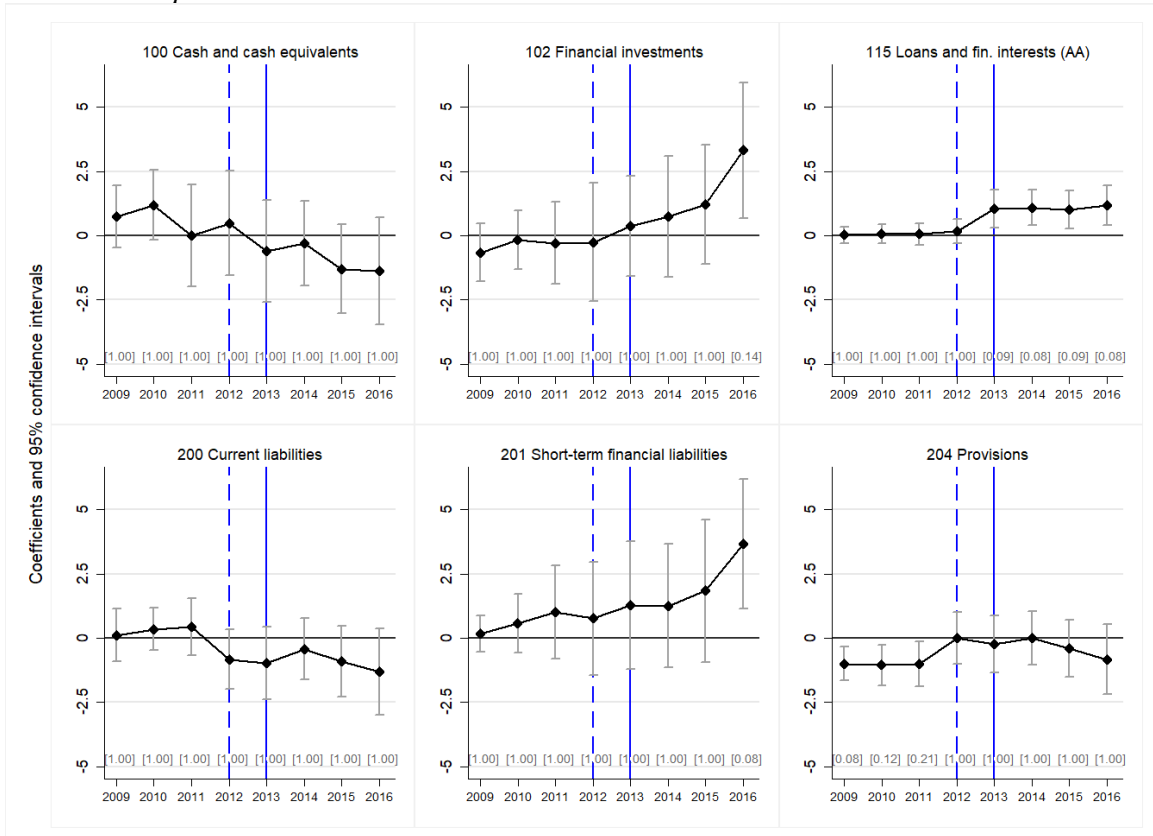
Note: The graphs depict the estimated coefficients and the respective 95%-confidence interval as well as false discovery rates [q-values] in brackets. The blue lines represent the payment of the windfall transfers in 2013; the blue broken lines represent the announcement of the windfall in early 2012.

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 and 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 from this perspective.[20] 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 (e.g., Persson and Tabellini 2000; Besley 2006). 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, in which decisions are made in majority votes. Hence, it remains important to cater to the electorate at large to pass policy in municipal assemblies. Among other topics, the local tax multiplier 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 there was significant pressure for tax cuts coming from the citizens in local assemblies.

Second, municipalities 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

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[20] Substantial deviations from the permanent income hypothesis are also documented for private consumption. Recently, Kueng (2018) provides evidence for excess sensitivity of private consumption to the regular and salient payments of the Alaska Permanent Fund. He estimates marginal propensities to consume of 25 percent on non-durables, on average. These recent estimates are similar to earlier studies that estimated marginal propensities to consume between 12 to 40 percent as a reaction to income tax rebates (e.g., Johnson, Parker, and Souleles 2006) or fiscal stimuli programs (e.g., Parker et al. 2013; Misra and Surico 2014).

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.5 and OA.6 we provide evidence that these intuitions hold more generally when considering *all* accounting outcomes. In 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.6). 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.5 and OA.6). 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.9, upper middle). The large and unorganized group of taxpayers benefits through tax cuts that the media cover extensively (Figure OA.9, upper left), but are harmed through the induced imbalances leading to, for example, higher imbalances and depreciation which are not directly and personally perceptible (Figure OA.9 upper right).

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 misperceived 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. However, it is important to note that it is impossible for us to rule out misconceptions of the temporary nature of the windfall and that we cannot empirically test such a claim. Without such misconceptions, the permanent and large adjustments in current expenditures and revenues would require strong additional assumptions. These could be related to some form of loss aversion by voters, voter inertia, or forms of mental accounting (e.g., Hines and Thaler 1995; Lago-Peñas 2008), where once granted favors are difficult to take back.

Relatedly, 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 and Passarelli 2019).

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 willingly 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 to the windfall. Neither economic or demographic, nor institutional or political differences substantially affect our overall results. Further research should address 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 as well as municipal and time fixed effects, and that increases in public debt are relative to the counterfactual situation without the windfall. In this specific period (after the first years of the great recession, which did not hit Switzerland particularly hard), 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.[21] 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

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[21] 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%.

the increases in public debt could be absorbed quite easily and we are not aware of any serious discussion about unsustainable patterns in the evolution of local public debt.

Figure 8: Trends in municipal gross and net debt, 1995 – 2016
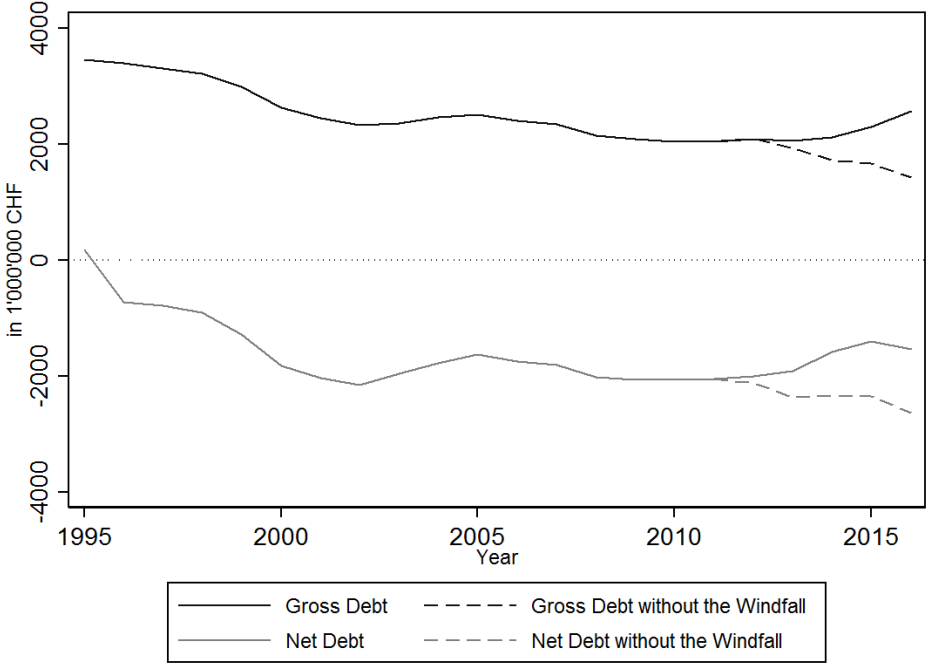
Third, and maybe most important, why do we observe these unsustainable patterns in the reaction to the windfall, while we do not observe overall imbalances or unsustainable patterns in general public finances in the canton of Zurich? Or, put differently, if politicians overspend and redirect resources 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. In normal times, without large shocks, local public finances are the results of a local bargaining process. The 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 redistributional character and consequences of accepting deviations from the political consensus.

However, in times with a highly mediatized positive one-off windfall, additional 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: six 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,[22] it generated significant media attention and might have made all interest groups aware of the extra-money to be distributed.

In such a context, strategies to fend off demands on redistributional 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 resist such demands and might engage in overpromising. They might allocate highly visible and mediatized benefits to taxpayers through tax cuts, and accommodate special interests with transfers where it is least visible. Such patterns are well in line with our empirical results and anecdotal evidence.

How credible is such an interpretation? Given that the windfall was, in relative terms, not of enormous magnitude (about 3% of current expenditures), implementing policy responses remaining below the referendum thresholds was not difficult. Moreover, 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.[23] 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 (e.g., Besley and Case 1995), because basically all municipalities benefited from this one-off windfall.

It might have been different with a much larger shock. Similar response patterns would have caused larger reactions in absolute terms. First, it might have been more difficult to remain below referendum thresholds to avoid mandatory referendums. Second, it might have made it more difficult to accessing external financing at similarly favorable conditions.

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[22] 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).

[23] Moreover, the minister of the interior of the canton of Zurich, Jacqueline Fehr, replied to our results in an article published in the "Neue Zürcher Zeitung", the leading newspaper in German-speaking Switzerland. Her reply does not suggest an awareness of the induced patterns (Fehr 2019).

Alternatively, we could also speculate that municipalities might react differently to shocks originating from a municipality's proper tax base versus a windfall coming from an external tax base. Our windfall originates from an IPO at the London Stock Exchange, which in turn increased temporarily the tax base of one particular municipality and was only then affecting all other municipalities through a redistributive equalization scheme. In a companion paper, we analyze the impact of revenue shocks originating from a municipality's proper tax base (Berset, Huber, and Schelker 2020). We focus on the immovable property gains tax (IPGT), again in the canton of Zurich. The IPGT is a transaction tax on property ownership changes, where the tax rate is fixed by the canton, but the proceeds remain entirely with municipalities and are excluded from the fiscal equalization scheme. The proceeds of this tax are volatile and difficult to predict. From time to time, we observe particularly large IPGT revenue variation. Such shocks are similar in size as our equalization windfall measured at the municipal level. The IPGT shocks can be either positive (higher revenues than expected) or negative (lower than expected). In comparison to the present paper, we document very different patterns: Positive shocks are smoothed and negative shocks tend to be mitigated. The asymmetry in the fiscal response points to fiscal conservativism in the reaction to shocks originating from a municipalities proper tax base. However, in contrast to our windfall, such shocks are recurring and can be positive as well as negative.

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 Rüschlikon 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 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.[24] 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., Gylfason 2001; Sachs and Warner 2001; Hodler 2006; Bhattacharyya and Hodler 2010; van der Ploeg 2011; Brollo et al. 2013; Caselli and Michaels 2013; Borge, Parmer, and Torvik 2015; Caselli, Morelli, and Rohner 2015). According to this literature, natural resource windfalls can cause a 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 visible traces of a "curse".

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[24] We exclude Rüschlikon, the cities of Zurich and Winterthur, and 6 municipalities involved in an amalgamation.

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 primarily argue that the highly mediatized shock temporarily affected the politico-economic equilibrium and mobilized special interests. Given that the windfall provided one-off *additional* resources, politicians might have found it difficult to refuse new demands on grounds that accepting these demands had a direct redistributive effect on other groups or that a similarly negative shock might have to be smoothed in the near future. 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
Main outcome variables: main accounts, in CHF				
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
Main control variables				
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

ONLINE APPENDIX

Fiscal windfall curse

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August 2020

Table of content:

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OA.1: Replication of the equalization scheme and calculation of counterfactual transfers

The stated goal of the resources equalization scheme in the canton of Zurich is to reduce the differences between tax multipliers of municipalities (Kantonsrat des Kantons Zürich, 2010). The law specifies that the equalizing instrument should ensure that the resulting tax capacity of each municipality reaches at least the 95% of the cantonal average, i.e., the lower equalization threshold. To this purpose, poorer municipalities in terms of their tax capacity, receive unconditional transfers, which are financed by richer municipalities and by the canton. Municipalities are considered as financially strong if their tax capacity is above 110% of the cantonal average, i.e., the upper equalization threshold. The scheme is a dynamic redistributive instrument. It updates the municipality-specific transfers (positive or negative) each year t based on the relevant parameters in t–2.

For a financially weak municipality i, the transfer received in t ($T_{i,t}^+$) is formally defined as:

$$T_{i,t}^+ = \left(TC_{c,t-2} \cdot 0.95 - TC_{i,t-2}\right) \cdot Pop_{i,t-2} \cdot TM_{i,t-2},$$

where TC_c is the cantonal average relative tax capacity per capita, TC_i the municipal tax capacity per capita, Pop_i the number of municipal inhabitants and TM_i the municipal tax multiplier.

For a financially strong municipality j, the transfer paid in t ($T_{j,t}^-$) is formally defined as:

$$T_{j,t}^- = \left(TC_{j,t-2} - TC_{c,t-2} \cdot 1.1\right) \cdot 0.7 \cdot Pop_{j,t-2} \cdot TaxIndex_{c,t},$$

where $TaxIndex_c$ is a cantonal tax multiplier index that is equal to the cantonal average of the local tax multiplier in t divided by the cantonal average in year 2010.

The central parameter of the resource equalization scheme is the municipal tax capacity per capita, a measure of the local tax base. First, it is used to calculate the cantonal average relative tax capacity and the corresponding lower and upper equalization thresholds. The cantonal average relative tax capacity corresponds to the sum of municipal tax capacities per capita weighted by the municipal population. Secondly, the municipal tax capacity per capita determines the position of each municipality in the equalization scheme and it is used to calculate the amount that should be paid or received.[1]

Following the equalization rule and using the data at our disposal, we replicate the equalization transfers since its entry into force in 2012. Figure OA.1 shows that for the years 2013 to 2016, our replication corresponds precisely to the published official equalization transfers. Our replication for 2012 shows small differences with what has been published by the cantonal administration. These small differences are due to interim adjustments to the equalization rule in the year of its introduction (2012), in which a weighted average of the four previous periods of the relevant parameters are used for the calculation of transfers (see Article 34 of the Finanzausgleichsgesetz of July 12, 2010).

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[1] Mauchle and Schaltegger (2018) provide a detailed analysis of this equalization scheme. They point out several shortcomings of the rule. Among them, they emphasize the inadequacy between equalizing the municipal tax capacities and the targeted reduction of disparities in local tax multipliers, the high reliance on the tax capacity that does not account for other sources of fiscal revenue (e.g., property gains tax), the asymmetric calculation in the positive and negative transfers, and the inclusion of the tax multiplier in the calculation of the positive transfers that result in a subsidy for setting high tax multipliers.

Figure OA.1: Observed and replicated resource equalization scheme.
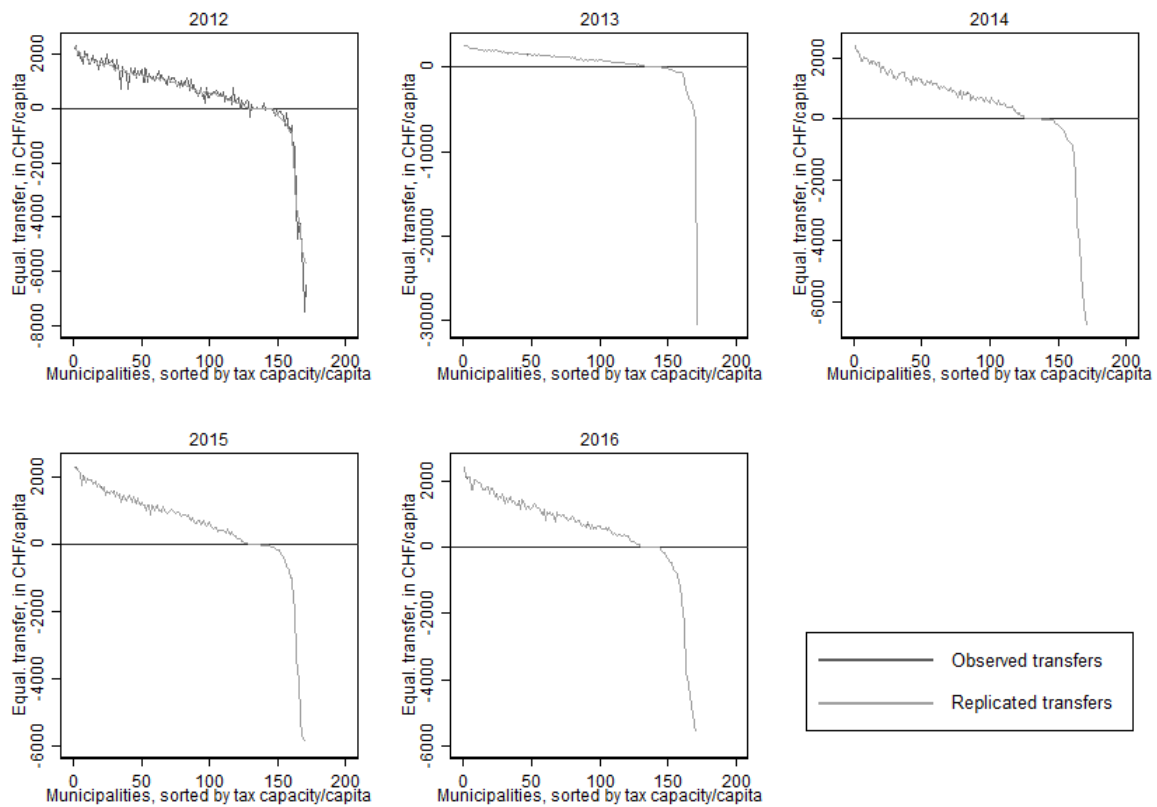
Our windfall measure consists of the difference between the observed municipality-specific equalization transfers in 2013 and the hypothetical, counterfactual transfers without the shock hitting Rüschlikon in 2011. The construction of the counterfactual equalization transfers requires correcting the parameters affected by Glencore IPO. Using these counterfactual parameters, we implement the equalization rule and re-calculate the entire equalization scheme for 2013 without the extraordinary contribution of Rüschlikon.

The Glencore windfall entered the equalization scheme in 2013 through a substantial one-off variation in Rüschlikon's tax capacity in 2011. From 2010 to 2011, Rüschlikon's tax capacity per capita jumped from CHF 11'687 to CHF 48'366 (+314%), before returning to 12'037 in 2012 (Table OA.1). This temporary variation in the tax capacity made Rüschlikon the richest municipality in the canton. In 2013, the municipality paid an unprecedented total amount of CHF 165 million to the equalization scheme. The Glencore IPO changed substantially the cantonal average relative tax capacity per capita, i.e., the relevant parameter to determine the upper and lower equalization thresholds. The calculation of the counterfactual equalization transfers requires to correct Rüschlikon's tax capacity as if there had been no shock.

The exact local income taxes paid by Mr. Glasenberg has never been officially released. We rely therefore on our accounting data and information provided by local newspapers to approximate and verify it. Assuming that the average tax capacity per capita would not have changed without the Glencore IPO, we chose to approximate the counterfactual tax capacity per capita by its value in 2010, a year prior to the shock. With the population of 2011, the approximated total tax capacity is CHF 62.9 million. Given the tax multiplier of 2011, this corresponds to an approximated counterfactual tax revenue of CHF 49.718 million. Taking the

observed tax revenues (CHF 206.3 million) and subtracting the counterfactual tax revenues (CHF 49.7), the extra tax revenue due to the Glencore IPO amounts to CHF 156.6 million. Based on information by local newspaper reports, which approximate the tax payment to about CHF 160 million (Baumann, 2012; Hotz, 2013), our calculations seem plausible.

Table OA.1: Rüschlikon's fiscal data, 2009-2016.

Year	Pop.	Res. Equal. in 1000 CHF	Tax capacity in 1000 CHF	Tax capacity in CHF/capita	Tax revenue in 1000 CHF	Tax multiplier in %
2009	5191	.	73'915	14'239	60'690	82
2010	5227	.	61'090	11'687	50'230	82
2011	5385	.	**260'452**	**48'366**	**206'280**	79
2011 (counterfactual)			*62'934*	*11'687*	*49'718*	
2012	5418	-39'127	65'219	12'037	47'351	72
2013	5542	**-164'877**	67'193	12'124	48'734	72
2013 (counterfactual)		*-29'044*				
2014	5573	-30'505	59'886	10'746	42'989	72
2015	5664	-31'510	59'435	10'493	44'606	75
2016	5720	-26'654	63'901	11'171	47'823	75

Source: Statistisches Amt des Kantons Zürich; counterfactuals based on our calculations.

We use the approximated tax capacity per capita of Rüschlikon to calculate the counterfactual equalization scheme in 2013. This consists of generating the counterfactual cantonal average relative tax capacity per capita and the two corresponding equalization thresholds. Only then can we calculate the municipality-specific transfers. The variation in Rüschlikon's tax capacity per capita contributed to an increase of the cantonal average relative tax capacity per capita of CHF 195 per capita (214 for the upper threshold, 185 for the lower threshold). Hence, the distance of each municipalities to the relevant threshold changed because of Glencore IPO. As a consequence, poorer municipalities were further away from the threshold and were to benefit from higher compensations. Richer municipalities came closer to the upper threshold and experienced a decrease in their contribution. In addition, a small number of municipalities even changed their relative position. Some municipalities that were supposed to be situated in-between the two thresholds and be "neutral" (neither receive nor pay transfers), happened to become recipients, while others switched from contributor to neutral.

Figure OA.2 pictures the observed and the counterfactual equalization patterns in per capita terms. From these two variables, we are able to compute the difference and, thus, obtain our windfall variable when multiplied with the population headcount. For poor municipalities, the difference corresponds to the additional amount received because of the shock, for rich municipalities, the amount saved.

Figure OA.2: Observed and counterfactual resource equalization transfers (per capita) in 2013.
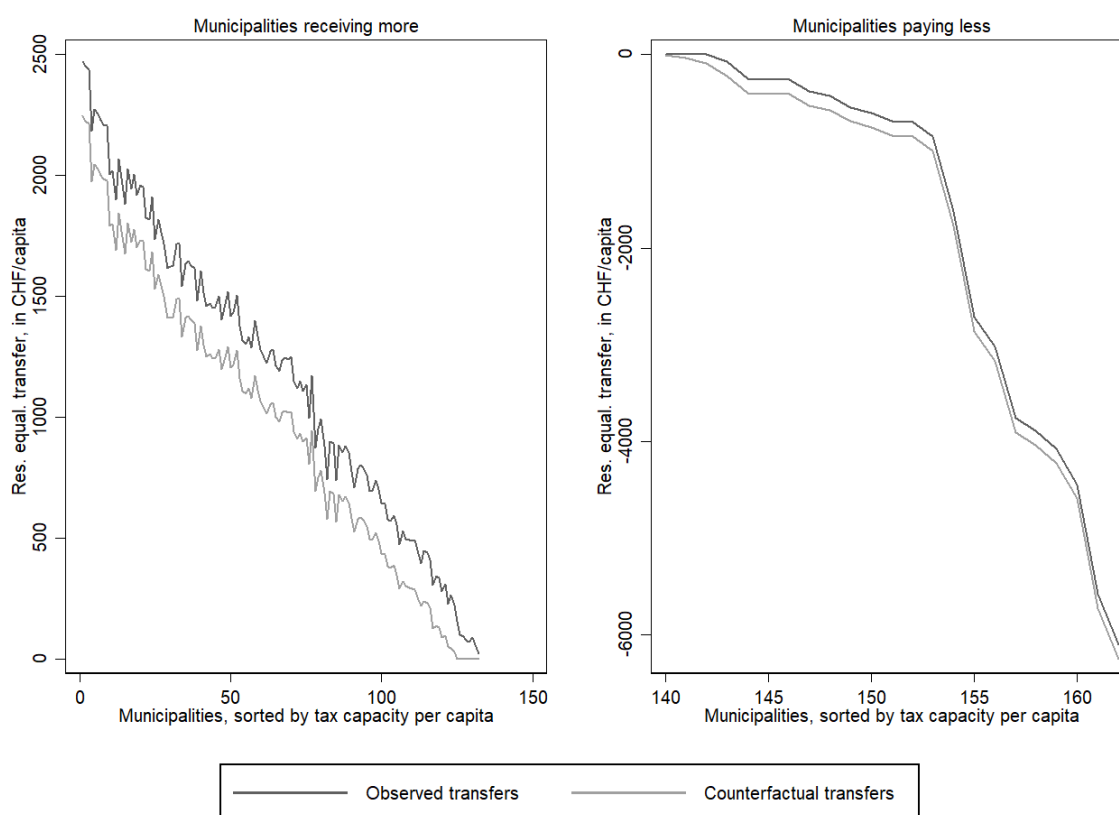
Our construction of the counterfactual equalization transfers has several implications. First, we keep the tax capacity of other municipalities in 2011 unchanged. If the Glencore IPO affected other municipalities (e.g., if other top managers or shareholders of Glencore reside in other municipalities of the canton), our measure would (rightly so) not include these spillovers. All such potential variation would be absorbed by the regular transfers for which we control in our regressions. Secondly, we know that other top managers of Glencore lived in Rüschlikon in 2011. Their incomes potentially also increased because of the IPO. Therefore, everything else being equal, we measure the total Glencore effect in Rüschlikon. However, it seems that—if anything—Mr. Glasenberg's contribution outweighed others by far.

Note once more, that the windfall measures the total additional transfers in absolute (CHF) rather than per capita terms (see equation on p. 2). The following left graph of Figure OA.3 plots the observed equalization transfers in CHF (incl. windfall) and the counterfactual equalization transfers (excl. windfall), while the right graph plots the windfall and the counterfactual equalization transfers. To improve readability and purely for presentational purposes Figure OA.3 only plots observations up to CHF 100 million tax capacity.

Figure OA.3: Observed and counterfactual resource equalization transfers (in CHF) in 2013.

OA.2: Accounting framework

Figure OA.4: Accounting framework

Investment account		
5 Expenditures		**6 Receipts**
50	Tangible fixed assets	60	Sales of tangible fixed assets
52	Loans and financial interests	61	Reimburs. and cost sharing from third parties
56	Investment contributions	62	Repayment of loans and financial interests
57	Redistributed investment grants	63	Repayment for tangible fixed assets
58	Other investment expenditure	64	Repayment of investment contributions
		66	Investment contributions
		67	Redistributed investment grants
59	Balance to capital account	69	Balance to capital account
7 Acquisitions of non-admin. assets		**8 Sales of non-admin. assets**
70	Real estate	80	Real estate
71	Acquisition of movables	81	Sale of movables
79	Report to capital account	89	Report to capital account

Financing

Net investment
(50+52+56+58-60-61-63-64-66)

Cash flow
(331+332+333+380-480+9120-9121)

Need for additional debt in *t*

Current account		
3 Expenses		**4 Revenues**
30	Personnel expenses	40	Tax receipts
31	Operating expenses	41	Royalties and concessions
32	Interest paid	42	Revenue from assets
34	Unassigned grants	43	User charges and fees
35	Compensations to public authorities	44	Revenue shares and contributions unassigned
36	Subsidies	45	Reimbursements from public authorities
37	Redistributed operating grants	46	Subsidies
38	Net expense for special financing	47	Redistributed operating grants
39	Internal allocations	48	Withdrawals from special financing
33	Depreciations	49	Internal allocations
91	Current balance (9120 Surplus, 9121 Deficit)		

Capital account		
1 Assets		**2 Liabilities**
10	**Non-admin. assets**	**20**	**Liabilities**
100	Cash and cash equivalents	200	Current liabilities
101	Receivables	201	Short-term financial liabilities
102	Financial investments	202	Long-term financial liabilities
103	Prepaid exp. & accrued inc.	203	Liabilities toward other entities
11	**Admin. assets**	204	Provisions
114	Tangible fixed assets	205	Accrued exp. & deferred inc.
115	Loans and fin. interests	**21**	**Compensations**
116	Investment contributions		
117	Other assets		
12	**Advances for special financing**	**22**	**Liabilities toward special financing**
13	**Accumulated deficit**	**23**	**Net assets/equity**

Source: Authors' elaboration based on information provided by the Direktion der Justiz und des Innern des Kantons Zürich (1984).

Note: The accounting framework uses a 3-digit numbering system that identifies any account and the respective subaccounts. The two first digits of a subaccount indicate to which main account it belongs (e.g., "301 Salaries of admin. & op. staff" is a subaccount of "30 Personnel expenses"). The subaccounts of the current and investment accounts are not presented in the figure.

OA.3: Sparse regression specification

Table OA.2: Impact on accounting aggregates when only including regular equalization transfers, population and tax capacity as covariates.

	(1) Current Expend.	(2) Current Revenue	(3) Current Balance	(4) Cash Flow	(5) Net Invest.	(6) Gross Debt	(7) Net Debt
Windfall$_{2012}$	3.898***	1.875***	-1.639***	-1.259**	0.575	0.949	2.100**
(β_{-1})	(0.396)	(0.470)	(0.547)	(0.485)	(0.466)	(1.301)	(1.021)
	[0.001]	[0.001]	[0.003]	[0.008]	[0.071]	[0.129]	[0.020]
Windfall$_{2013}$	3.794***	2.529***	-1.075***	-1.293***	0.231	1.008	3.097***
(β_0)	(0.451)	(0.454)	(0.270)	(0.303)	(0.392)	(1.388)	(1.080)
	[0.001]	[0.001]	[0.001]	[0.001]	[0.150]	[0.129]	[0.004]
Windfall$_{2014}$	3.662***	1.481***	-1.809***	-2.061***	0.130	2.535	4.972***
(β_1)	(0.467)	(0.416)	(0.295)	(0.379)	(0.433)	(1.646)	(1.321)
	[0.001]	[0.001]	[0.001]	[0.001]	[0.179]	[0.046]	[0.001]
Windfall$_{2015}$	3.388***	1.436**	-1.479***	-1.560***	0.432	4.368**	6.780***
(β_2)	(0.584)	(0.558)	(0.305)	(0.352)	(0.469)	(1.786)	(1.490)
	[0.001]	[0.008]	[0.001]	[0.001]	[0.103]	[0.010]	[0.001]
Windfall$_{2016}$	3.060***	1.888***	-0.938**	-0.979*	1.441	7.545***	6.931***
(β_3)	(0.619)	(0.576)	(0.414)	(0.511)	(0.881)	(2.411)	(1.914)
	[0.001]	[0.002]	[0.015]	[0.024]	[0.039]	[0.002]	[0.001]
Reg. equal. transfers	yes	yes	yes	yes	yes	yes	yes
Population	yes	yes	yes	yes	yes	yes	yes
Tax capacity	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
N	1458	1458	1458	1458	1458	1458	1458
Municipalities	162	162	162	162	162	162	162
R2	0.765	0.737	0.447	0.451	0.0661	0.189	0.267

OA.4: Robustness tests

Table OA.3: Elimination of influential observations (minimum/maximum)

| | Windfall$_{2013}$ | | |
| | (1) | (2) | (3) |
Outcome	Full sample	Smallest effect	Largest effect
30 Personnel expenses	0.725***	0.659***	0.824***
	(0.177)	(0.180)	(0.151)
	[0.002]	[0.006]	[0.001]
31 Operating expenses	0.23	0.15	0.283*
	(0.147)	(0.138)	(0.146)
	[0.287]	[0.527]	[0.16]
33 Depreciation	-0.237	-0.365	-0.0909
	(0.274)	(0.257)	(0.259)
	[0.510]	[0.359]	[0.773]
36 Subsidies	0.907***	0.804***	1.039***
	(0.222)	(0.225)	(0.205)
	[0.002]	[0.008]	[0.001]
40 Tax receipts	-0.803***	-0.916***	-0.722***
	(0.217)	(0.196)	(0.208)
	[0.004]	[0.001]	[0.009]
43 User charges and fees	0.618*	0.432	0.758**
	(0.317)	(0.275)	(0.292)
	[0.190]	[0.345]	[0.045]

Heteroscedasticity corrected and clustered standard error are presented in parentheses.

* p< 0.10, ** p<0.05, *** p<0.01. False discovery rates [q-values] are reported in brackets.

Note: We run 162 regressions per outcome variable and always exclude one of the 162 municipalities. In this table we report the regression coefficients of the windfall variable in 2013 for the full sample and for the samples excluding the most influential observation (minimum and maximum effect size). Column 1 reports the effect based on the full sample of municipalities (as reported in the main text). Column 2 reports the smallest and column 3 the largest estimated coefficient obtained from regressions on each outcome excluding one municipality at a time. We only report the most important results according to our main analysis. The results are qualitatively similar for the impact in other years (2012, 2014-2016) and on other outcomes.

Figure OA.5: Municipalities receiving more *versus* paying less
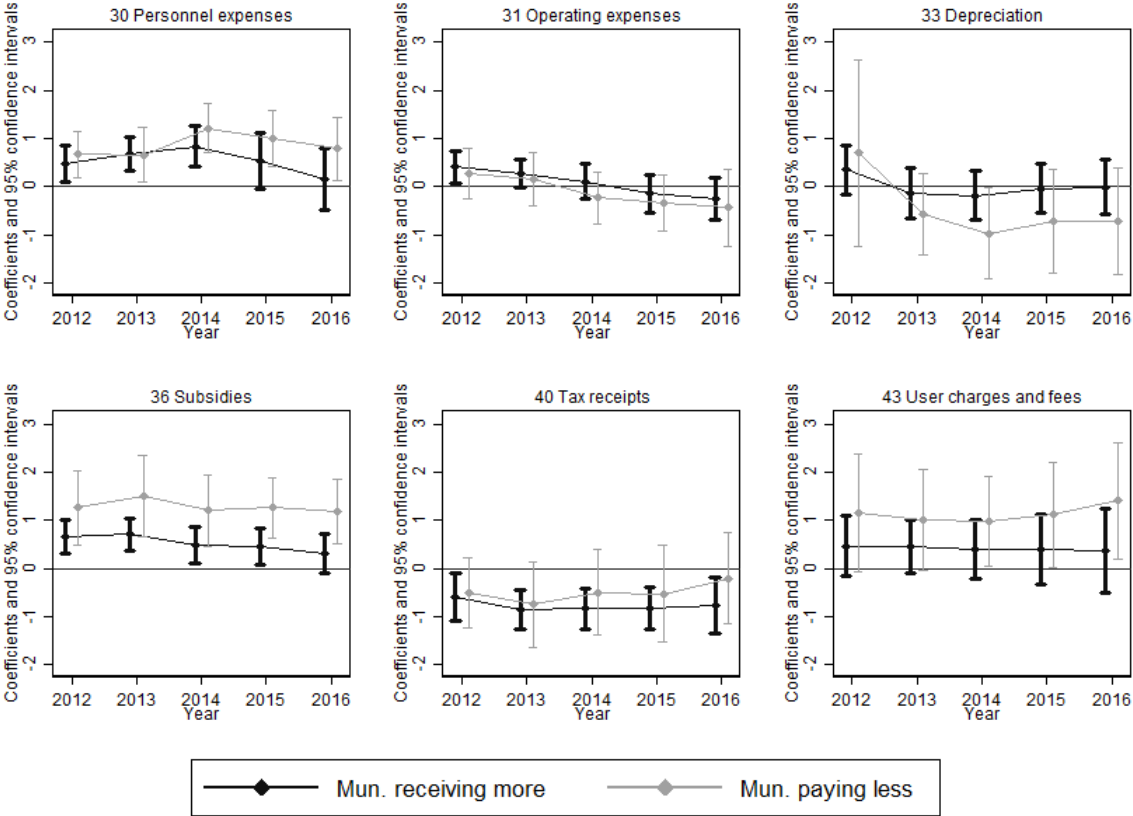
Note: The 95% confidence interval around the estimated coefficients for the municipalities "receiving more" (in black) tests against the null hypothesis of coefficients not being significantly different from zero. The 95% confidence interval around the estimated coefficients of those "paying less" (in gray) tests against the null hypothesis of coefficients not being significantly different from the baseline coefficients of those "receiving more" (in black). Definition: municipalities "receiving more" are those situated below the threshold of 95% average cantonal tax capacity. Municipalities "paying less" are those situated above the threshold of 110% of the average cantonal tax capacity.

Figure OA.6: Municipalities with a population size below *versus* above 10'000 inhabitants
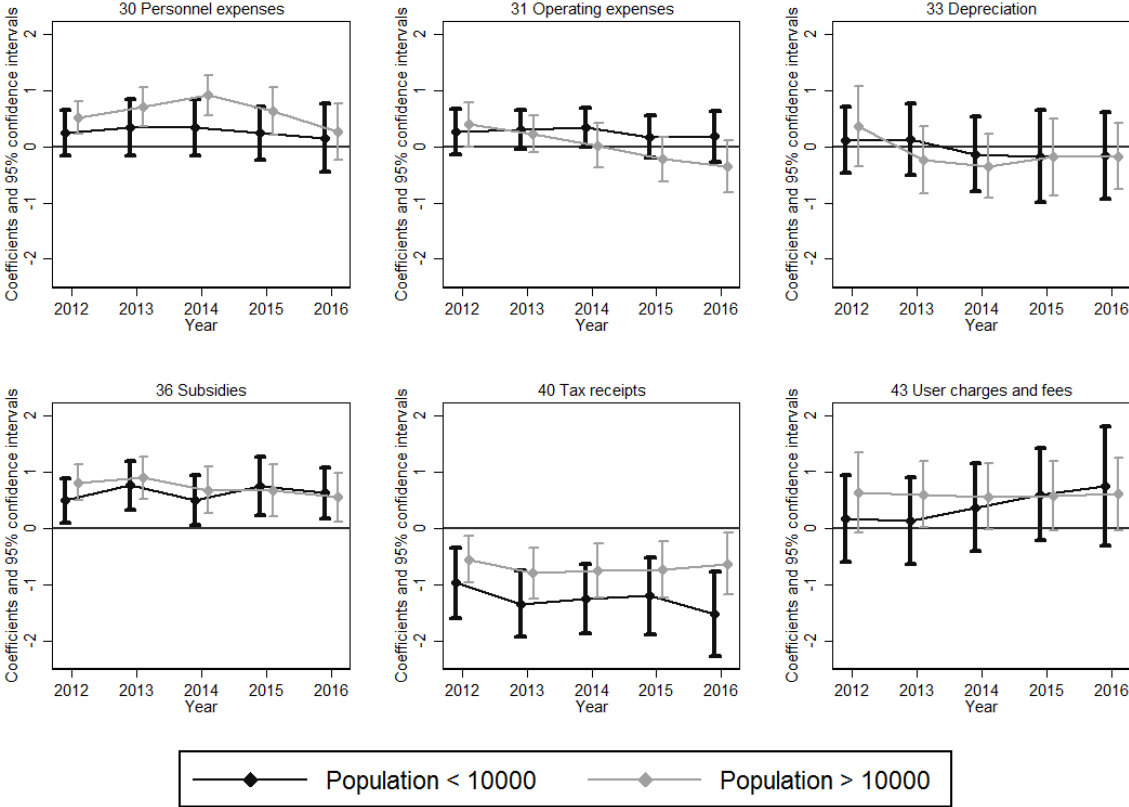
Note: The 95% confidence interval around the estimated coefficients for municipalities below 10'000 inhabitants (in black) tests against the null hypothesis of coefficients not being significantly different from zero. The 95% confidence interval around the estimated coefficients of those above 10'000 inhabitants (in gray) tests against the null hypothesis of coefficients not being significantly different from the baseline coefficients of those below 10'000 inhabitants (in black).

Table OA.4: Mechanical impact of the windfall

	(1) 341 Resource Equalization (negative)	(2) 445 Resource Equalization (positive)
Windfall $_t$ (negative transfer)	-0.927***	-0.0134
	(0.191)	(0.201)
	[0.001]	[0.899]
Windfall $_t$ (positive transfer)	0.0682	0.919***
	(0.171)	(0.186)
	[0.853]	[0.001]
Controls	Incl.	Incl.
Municipal FE	Incl.	Incl.
Year FE	Incl.	Incl.
Observations	1458	1458
Municipalities	162	162
R^2	0.693	0.684

Note: Heteroscedasticity corrected and clustered standard error are in parentheses.
* p<0.10, ** p<0.05, *** p<0.01. False discovery rates [q-values] are reported in brackets.

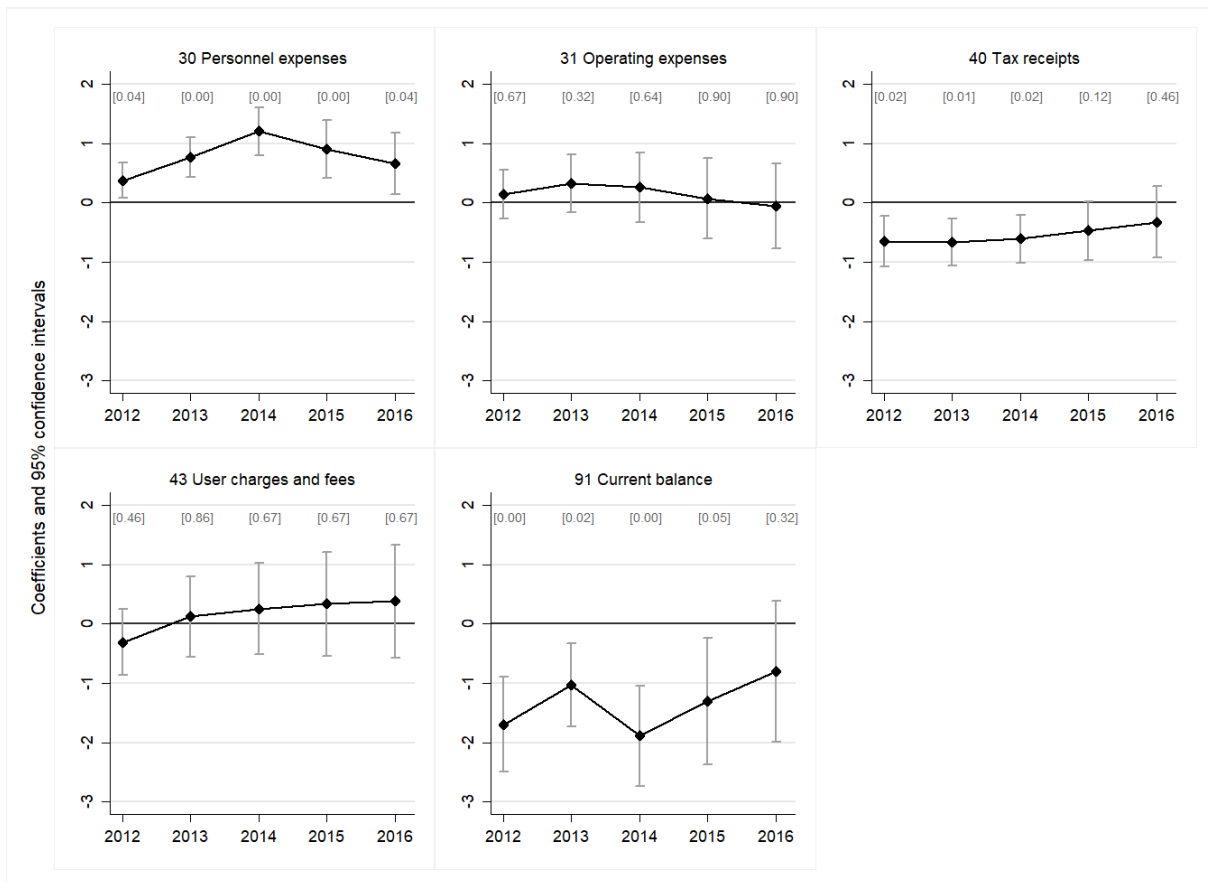Figure OA.7: Extended time period spanning 2000-2016

Figure OA.8: Extended time period spanning 2000-2016 and municipal time trends
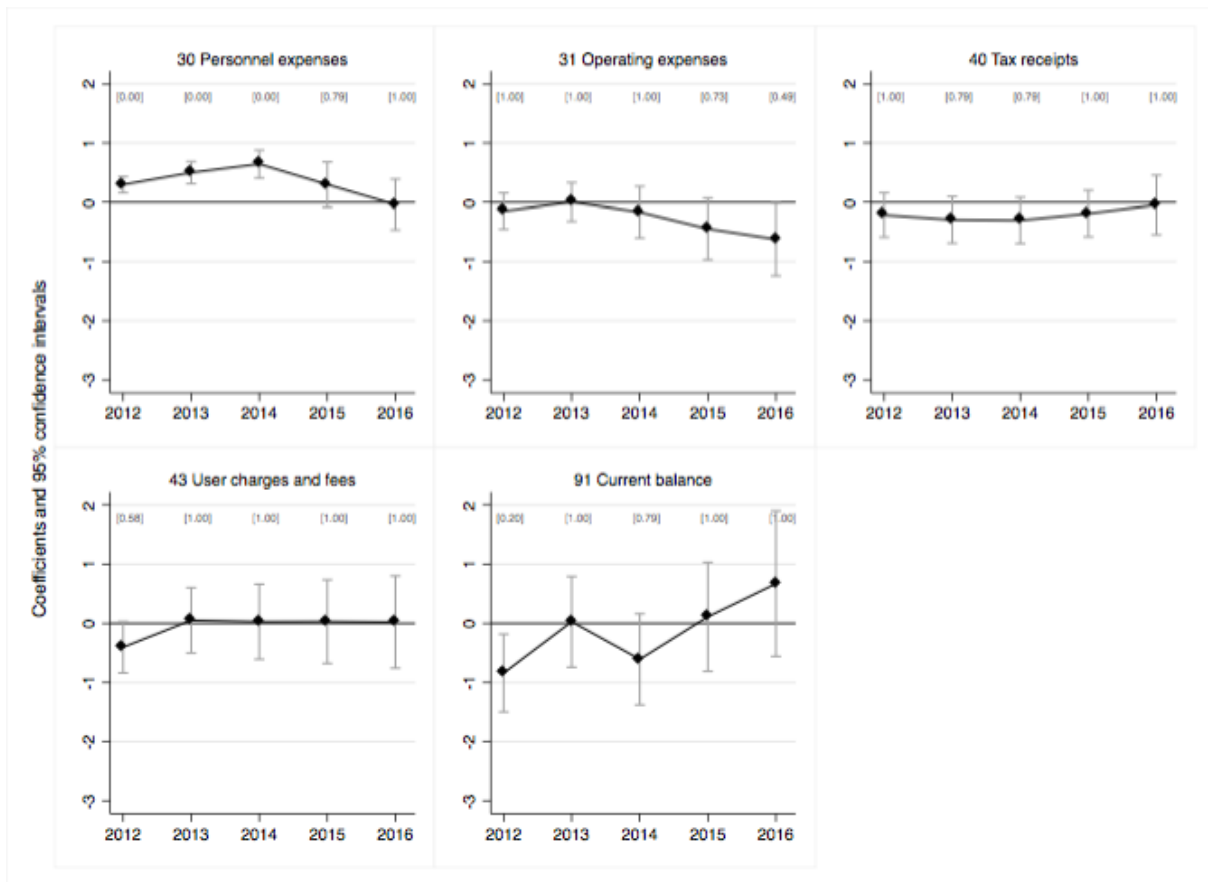
OA.5: The political economy of the windfall

From a political economics perspective (e.g., Persson & Tabellini, 2000; Mueller, 2003; Besley, 2006), policy makers are not welfare-maximizing social planners, but rather individuals that maximize their private utility subject to some constraints. We assume that policy makers want to win elections[2] or—as in the case of local politics in Switzerland—win public votes and ballots, and that they want to provide rents to some specific groups close to their own preferences. In what follows, we concentrate on two constraints: Group size and heterogeneity, and information costs and asymmetries.

First, politicians want to win elections and ballots and, thus must appeal—at least partially—to local voters. However, voters are heterogeneous and have potentially very different interests and preferences. The ability to organize a political interest group to articulate the groups' preferences depends on the size of the group, its heterogeneity, and the intensity of its preferences (Olson, 1965; Mueller, 2003). Therefore, not all policy issues, and hence, not all voters, carry the same weight in policy makers' objective functions. Conclusively, the number of potential votes a specific group incorporates, and the group's ability to organize, are important features from a policy maker's perspective.

Second, in a standard principal–agent framework (e.g., Besley, 2006), information asymmetries provide politicians the necessary slack to deviate from voter preferences. The media are an important source of information. They affect information costs and information asymmetries and have a direct effect on policy makers' behavior (e.g., Besley & Burgess, 2002; Snyder & Strömberg, 2010).

Therefore, we analyze whether these politico-economic constraints can systematically explain the patterns in our data, and therefore policy makers' behavior. We derive four simple parameters: 1) group size, 2) degree of organization, 3) personal perceptibility and immediacy of policy, and 4) public information about policy via media coverage.

Group size: Larger groups carry more potential votes. More specifically in the context of our municipalities with a town meeting and potentially low electoral competition, larger groups still

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[2] The literature typically assumes that politicians want to win elections. However, political competition at the local level in the canton of Zurich is not overwhelming. It is notoriously difficult to find enough candidates for political offices. Nevertheless, politicians are tied to the electorate at large, because they have to face citizens in municipal assemblies several times a year. Therefore, we assume, similar to the traditional assumption, that politicians want to cater to the electorate at large (at least partially).

wield a rather important influence in local town meetings. Thus, swaying large groups might be essential. *Degree of political organization*: However, large groups find it harder to organize. Therefore, small groups are known to be more effective in lobbying for specific favors. The capability to organize depends not only on the size of the group, but also on its homogeneity in preferences, the intensity of these preferences, and other factors that might help or impede organization (e.g., Olson, 1965; Mueller, 2003). For example, relatively heterogeneous groups of parents might be able to organize their common interest in the quality of education for their kids. However, it might be difficult for the residents of a nursing home to effectively organize and voice their preferences. They might have to rely on relatives to speak on their behalf.

The two remaining factors are more closely related to information asymmetries. *Personal perceptibility and immediacy of a policy*: How closely and directly a voter is affected by a particular policy and how quickly he perceives it constitutes the private information channel. For example, the perceptibility and immediacy of a tax reduction is high, because voters directly and immediately perceive it with their tax declaration and tax payment. The link between this specific policy and its effect on a voter's personal situation is easily identified. The same is true for a salary rise of a public administrator. However, a general increase in depreciations is hardly perceptible at the individual level and it does not immediately and tangibly affect voters. *Media coverage*: The ability to form a political opinion is contingent on the availability of information (e.g., Besley & Burgess, 2002; Snyder & Strömberg, 2010). This might directly depend on the media coverage of public policies. This is the public information channel.

a) Classifying politico-economic constraints

We independently categorize the financial flow of each account according to these four dimensions. For each account, we ask: Who is affected by the financial flow (small/large group, organized/unorganized)? Are they immediately affected by and aware of its implications? How often did the media cover the various financial flows in the respective accounts? We classify each account with four dummy variables: large/small group, organized/unorganized, high/low immediacy, and highly/low media. Table OA.6 summarizes the coding for each account.

Group size (L/S): Specifically, we code whether or not a specific group is affected by the account, and then decide if the group is large or not. For example, the account reflecting income tax revenues relate to taxpayers. We code taxpayers to form a large group. Personnel expenses relate to administrative staff, and operating expenses, such as fuel, concern local providers. We code those as small groups, etc. Unspecific accounts, such as the current account balance or depreciations, concern everybody and we categorize them as affecting a large group.

Organization (O/U): For small groups, we then determine whether the group is likely to be organized. Most of the small and specific groups are coded as being organized (O), for example, local employees, local private providers and firms, or payers of specific user charges such as local schools. We classify some small groups as being unorganized (U) if they involve heterogeneous agents like the buyers or sellers of non-administrative assets; if they are counterparts in highly regulated, technical, and rare local transactions (e.g., buyers or sellers of rights of forest use); and nursing home residents who are typically highly dependent on other people.

Immediacy/perceptibility: We then determine whether the account concerned a specific group that could immediately perceive the impact of an adjustment. Subsidies to private individuals or regular income taxes have a direct and tangible effect on local individuals and taxpayers (HI: high immediacy), whereas depreciations or deficits cannot be directly linked to a specific group (LI: low immediacy).

Media coverage: We measure the degree of media coverage by counting how often the content pertaining to a specific account category appeared in Swiss German newspapers between January 1, 2000 and December 31, 2017. The canton of Zurich provides a detailed description of the accounting model, which mentions each account with its title and a description including keywords. We make sure that articles unrelated to municipal accounts are not included in our counts. The large majority of the accounts were only rarely mentioned in the media, while a few accounts received much attention. For example, municipal tax revenues (2150 mentions), depreciations (861), and the current account balance (2884) received much attention. Other categories such as rental incomes (24), incomes from bank balances (24), or user charges for nursing homes and local school fees (20) received very little attention; other, more technical accounts were not mentioned at all. We would not trust the resulting count to reflect precisely the number of times newspapers reported on a specific account. However, we believe that an aggregated measure distinguishing between accounts with low and high media attention serves our purpose. We observe a highly skewed distribution of media coverage. Accounts falling in the top decile of the distribution are classified as "high media" (HM), the others as "low media" (LM).

Of the 16 possible combinations of the four categories, we find that not all actually exist in the data (Table OA.5). For example, we did not code any large and at the same time well-organized groups at the local level, and we did not code any combinations in which small groups were affected and the effect was not immediately perceptible for those groups. Note that we code

each dimension independently. To us it makes intuitive sense that these combinations do not materialize in our coding. The detailed classification of accounts is presented in Table OA.6 below.

Table OA.5: Politico-economic classification of accounts

Group	No. of accounts	Size of group (L/S)	Degree of organization (O/U)	Immediacy (HI/LI)	Media coverage (HM/LM)	Account examples
Gr. 1	1	L	U	HI	HM	tax receipts
Gr. 2	57	S	O	HI	LM	e.g., personnel exp., subsidies
Gr. 3	3	L	U	LI	HM	e.g. current balance, depreciation
Gr. 4	17	L	U	LI	LM	e.g. interests, financial revenues
Gr. 5	6	L	U	HI	LM	e.g. fines, general user charges
Gr. 6	24	S	U	HI	LM	e.g. home fees, sales of forests

b) Empirical traces of politico-economic tradeoffs

We want to test, whether or not the windfall patterns in our accounting data are related to these politico-economic factors. We sum up all the flow accounts according to the different group classifications described above and estimate the effect of the windfall on the total flows to and from these groups.

We exclude the predetermined mandatory contributions to other layers of governments (e.g., positive and negative transfers from, or to, the central government) and mechanically affected accounts (e.g., social welfare contributions due to increases in personnel expenses). To normalize the direction of the effects, we multiply all coefficients pertaining to the revenue side by -1 (the right-hand side of all current and investment accounts). This is necessary, because expenditures and revenues are inscribed on different sides of the accounts. Therefore, the effect points in different directions. We do not include the capital accounts because they measure the *cumulative* effect of the windfall and always affect the entire population of a municipality (and never specific groups).

The patterns in Figure OA.9 indicate that large unorganized groups (Gr. 1) tend to benefit from the windfall (about CHF +0.7 per CHF 1 of windfall) where the policy is easily perceived by voters (high immediacy) and highly mediatized (e.g., tax cuts). Large unorganized groups tend to lose (about CHF -2.0 per CHF 1 of windfall) from the windfall when immediacy is low, despite high media attention (Gr. 3). The results of this specific group are primarily driven by

the effect of the current balance reflecting the imbalance of the implemented policies, despite the fact that media attention is particularly high on this category. In contrast, small organized groups (Gr. 2) tend to benefit from the windfall (about CHF +2 per CHF 1 of windfall) if the flows are easily perceptible (i.e., if the beneficiaries know about the benefit and might be able to return the favor), and remain under the radar of the media (e.g., personnel expenses). In addition, the windfall tends to initially hurt small, but unorganized, groups (Gr. 6).

Our interpretations posit that policy makers react to their individual incentives to maximize political benefits. On the one hand, they want to be reelected and, thus, target the large, but unorganized group of taxpayers with highly mediatized and immediately perceptible benefits, such as tax cuts. On the other hand, they also want to 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 attention. To compensate for the resulting imbalances, they shift the burden to less immediately perceptible dimensions and to possibly unorganized groups.

Figure OA.9: Effect on the windfall on politico-economic groups
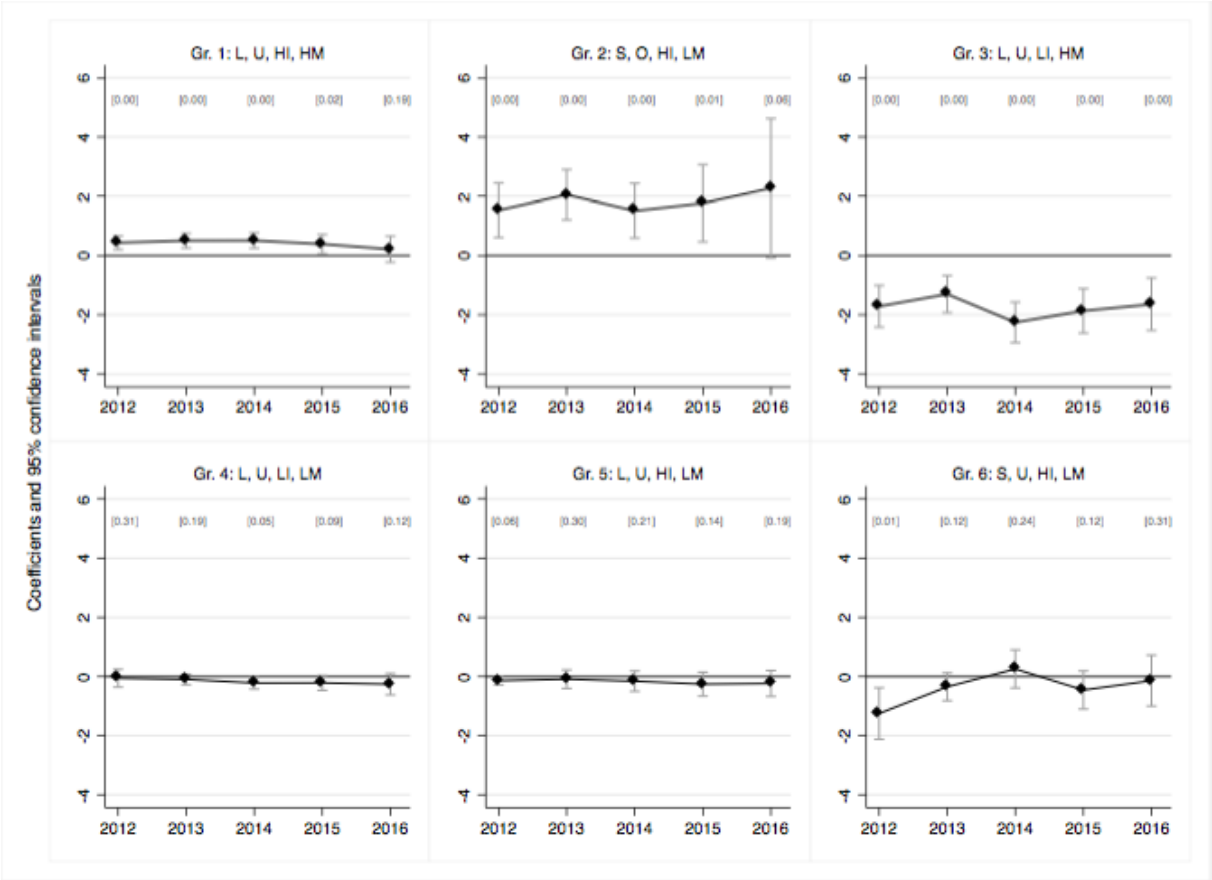
OA.6: Politico-economic accounts categorization

Table OA.6: Politico-economic accounts categorization

Account	Stakeholder	Size of group (L/S)	Degree of organization (O/U)	Immediacy (HI/LI)	Occurrence in media	Media coverage (HM/LM)	Group
300 Authorities and commissions	Staff	S	O	HI	85	LM	2
301 Salaries of admin. & op. staff	Staff	S	O	HI	85	LM	2
302 Salaries of teaching staff	Staff	S	O	HI	85	LM	2
305 Other employer contributions	Staff	S	O	HI	85	LM	2
306 Additional remuneration	Staff	S	O	HI	85	LM	2
308 Temporary work from third party	Staff	S	O	HI	85	LM	2
309 Other personnel expenditure	Staff	S	O	HI	85	LM	2
310 Office and teaching supplies and printing	Providers & Staff	S	O	HI	103	LM	2
311 Purchase of movables	Providers & Staff	S	O	HI	103	LM	2
312 Water energy fuel	Providers & Staff	S	O	HI	103	LM	2
313 Services and fees	Providers & Staff	S	O	HI	103	LM	2
314 Building maintenance	Providers & Staff	S	O	HI	103	LM	2
315 Upkeep of movables	Providers & Staff	S	O	HI	103	LM	2
316 Rental and user charges	Providers & Staff	S	O	HI	103	LM	2
317 Compensation for expenditure	Providers & Staff	S	O	HI	103	LM	2
318 Third party services and fees	Providers & Staff	S	O	HI	103	LM	2
319 Miscellaneous operating expenditure	Providers & Staff	S	O	HI	103	LM	2

320 Interest paid on current liabilities	.	L	U	LI	201	LM	4
321 Interest paid on short-term debt	.	L	U	LI	201	LM	4
322 Interest paid on long-term debt	.	L	U	LI	201	LM	4
323 Interest on liabilities toward other entities	.	L	U	LI	201	LM	4
329 Other interest paid	.	L	U	LI	201	LM	4
330 Depreciation on non-administrative assets	.	L	U	LI	861	HM	3
332 Additional depreciation (AA)	.	L	U	LI	861	HM	3
363 Subsidies to own companies	Providers & Staff	S	O	HI	183	LM	2
364 Subsidies to mixed companies	Providers & Staff	S	O	HI	183	LM	2
365 Subsidies to private companies	Providers & Staff	S	O	HI	183	LM	2
366 Subsidies to private individuals	Providers & Staff	S	O	HI	183	LM	2
367 Subsidies abroad	Providers & Staff	S	O	HI	183	LM	2
369 n.a.	Providers & Staff	S	O	HI	183	LM	2
380 Net expense for special financing	.	L	U	LI	115	LM	4
381 Net expense for other entities	.	L	U	LI	115	LM	4
400 Regular tax revenues	Taxpayers	L	U	HI	2150	HM	1
420 Interest on current accounts	.	L	U	LI	24	LM	4
421 Interest on receivables	.	L	U	LI	24	LM	4
422 Interest on financial investments	.	L	U	LI	24	LM	4
423 Interest on non-administrative assets	.	L	U	LI	24	LM	4
425 Revenue from loans (AA)	.	L	U	LI	24	LM	4

426 Revenue from financial interests (AA)	.	L	U	LI	24	LM	4
427 Building revenue (AA)	.	L	U	LI	24	LM	4
430 Exemption taxes	Users	L	U	HI	20	LM	5
431 Fees for administrative acts	Users	L	U	HI	20	LM	5
432 Nursing home fees	Users	S	U	HI	20	LM	6
433 School fees	Parents	S	O	HI	20	LM	2
435 Proceeds from sales	Buyers	L	U	HI	20	LM	5
436 Reimbursements and cost sharing from third parties	Buyers	L	U	HI	20	LM	5
437 Fines	Private individuals	L	U	HI	20	LM	5
438 Own work for investments	.	L	U	LI	20	LM	4
439 Other revenue from exchange transactions	Buyers	L	U	HI	20	LM	5
453 Reimbursements from own companies	Providers & Staff	S	O	HI	0	LM	2
463 Subsidies from own companies	Providers & Staff	S	O	HI	183	LM	2
465 Subsidies from private and institutions	Private individuals	S	O	HI	183	LM	2
480 Withdrawals from special financing	.	L	U	LI	115	LM	4
481 Withdrawals from trusts	.	L	U	LI	115	LM	4
91 Current balance	.	L	U	LI	2884	HM	3
500 Investment expenditure land	Providers	S	O	HI	0	LM	2
501 Investment expenditure civil engineering works	Providers	S	O	HI	83	LM	2
502 n.a.	Providers	S	O	HI	0	LM	2

503 Investment expenditure building construction	Providers	S	O	HI	74	LM	2
504 n.a.	Providers	S	O	HI	0	LM	2
505 Investment expenditure forests	Providers	S	O	HI	0	LM	2
506 Investment expenditure property plant and equipment	Providers	S	O	HI	7	LM	2
507 Compulsory stocks	Providers	S	O	HI	0	LM	2
509 Investment expenditure other tangible fixed assets	Providers	S	O	HI	0	LM	2
523 Loans and financial interests own companies	Providers & Staff	S	O	HI	216	LM	2
524 Loans and financial interests mixed companies	Providers & Staff	S	O	HI	216	LM	2
525 Loans and financial interests private institutions	Providers & Private	S	O	HI	216	LM	2
526 Loans and financial interests household	Providers & Individuals	S	O	HI	216	LM	2
563 Investment contributions own companies	Providers & Staff	S	O	HI	25	LM	2
564 Investment contributions mixed companies	Providers & Staff	S	O	HI	25	LM	2
565 Investment contributions private institutions	Providers & Private	S	O	HI	25	LM	2
566 Investment contributions households	Private individuals	S	O	HI	25	LM	2
569 n.a.	Providers	S	O	HI	25	LM	2
581 Planning spending	Providers	S	O	HI	0	LM	2
582 n.a.	Providers & Staff	S	O	HI	0	LM	2

589 Other investments	Providers & Staff	S	O	HI	0	LM	2
600 Sales of land	Buyers	S	U	HI	0	LM	6
601 Sales of civil engineering works	Buyers	S	U	HI	83	LM	6
603 Sales of building construction	Buyers	S	U	HI	74	LM	6
605 Sales of forests	Buyers	S	U	HI	0	LM	6
606 Sales of property plant and equipment	Buyers	S	U	HI	0	LM	6
607 Sales of compulsory stocks	Buyers	S	U	HI	7	LM	6
609 Sales of other tangible fixed assets	Buyers	S	U	HI	0	LM	6
610 Reimbursements and cost sharing from third parties	Buyers	S	U	HI	0	LM	6
611 Investissement exemption taxes	Buyers	S	U	HI	0	LM	6
623 Repayment of loans own companies	Providers & Staff	S	O	HI	216	LM	2
624 Repayment of loans mixed companies	Providers & Staff	S	O	HI	216	LM	2
625 Repayment of loans private institutions	Private individuals	S	O	HI	216	LM	2
626 Repayment of loans households	Providers & Staff	S	O	HI	216	LM	2
631 Repayment for civil engineering works	Providers & Staff	S	U	HI	83	LM	6
633 Repayment for building construction	Providers & Staff	S	U	HI	74	LM	6

643 Repayment of investment contributions own companies	Providers & Staff	S	O	HI	25	LM	2
644 Repayment of investment contributions mixed companies	Providers & Staff	S	O	HI	25	LM	2
645 Repayment of investment contributions private institutions	Providers	S	O	HI	25	LM	2
646 Repayment of investment contributions household	Private individuals	S	O	HI	25	LM	2
663 Investment contributions own companies	Providers & Staff	S	O	HI	25	LM	2
701 Acquisition of real estate land	Seller	S	U	HI	59	LM	6
702 Acquisition of real estate building construction	Seller	S	U	HI	59	LM	6
703 Acquisition of real estate with building lease	Seller	S	U	HI	59	LM	6
704 Acquisition of share of real estate	Seller	S	U	HI	59	LM	6
709 Acquisition and selling costs	Seller	S	U	HI	59	LM	6
710 Acquisition of movables	Seller	S	U	HI	7	LM	6
801 Sale of real estate land	Buyers	S	U	HI	59	LM	6
802 Sale of real estate building construction	Buyers	S	U	HI	59	LM	6

OA.7: Estimated effects of the windfall on all subaccounts

Current Accounts

308 Temporary work from third party

309 Other personnel expenditure

310 Office and teaching supplies and printing

311 Purchase of movables

312 Water energy fuel

313 Services and fees

314 Building maintenance

315 Upkeep of movables

316 Rental and user charges

317 Compensation for expenditure

318 Third party services and fees

319 Miscellaneous operating expenditure

320 Interest paid on current liabilities

321 Interest paid on short-term debt

322 Interest paid on long-term debt

323 Interest on liabilities toward other entities

329 Other interest paid

330 Depreciation on non-administrative assets

331 Compulsory depreciation (AA)

332 Additional depreciation (AA)

333 Depreciation of accumulated deficit

360 Subsidies to the Confederation

363 Subsidies to own companies

364 Subsidies to mixed companies

365 Subsidies to private companies

[1.00]   [0.72]   [1.00]   [0.86]   [1.00]

366 Subsidies to private individuals

[0.12]   [0.21]   [0.40]   [0.58]   [0.80]

367 Subsidies abroad

[0.63]   [0.86]   [0.78]   [1.00]   [0.94]

380 Net expense for special financing

[0.80]   [0.54]   [0.40]   [0.52]   [0.76]

381 Net expense for other entities

[0.77]   [0.59]   [0.51]   [0.59]   [0.68]

400 Regular tax revenues

[0.16]   [0.01]   [0.02]   [0.04]   [0.18]

Other tax revenues (403+404+406)

[0.37]   [0.34]   [0.23]   [1.00]   [0.68]

410 Concessions

[0.52]   [0.77]   [0.78]   [0.97]   [0.47]

30

420 Interest on current accounts · 421 Interest on receivables · 422 Interest on financial investments · 423 Interest on non-administrative assets · 424 Book profits · 425 Revenue from loans (AA) · 426 Revenue from financial interests (AA) · 427 Building revenue (AA)

428 Extraordinary financial revenue

429 Other financial revenue

430 Exemption taxes

431 Fees for administrative acts

432 Nursing home fees

433 School fees

434 User charges and services

435 Proceeds from sales

436 Reimbursements and cost sharing from third parties

437 Fines

438 Own work for investments

439 Other revenue from exchange transactions

450 Reimbursements from the Confederation

453 Reimbursements from own companies

460 Subsidies from Confederation

463 Subsidies from own companies

465 Subsidies from private and institutions

469 Miscellaneous transfer receipts

480 Withdrawals from special financing

91 Current balance

Investment Accounts

524 Loans and financial interests mixed companies

525 Loans and financial interests private institutions

526 Loans and financial interests household

560 Investment contributions Confederation

563 Investment contributions own companies

564 Investment contributions mixed companies

565 Investment contributions private institutions

566 Investment contributions households

580 Expropriations

581 Planning spending

589 Other investments

590 Balance to capital account revenue

592 Balance to current account surplus

593 Balance to special financing

600 Sales of land

601 Sales of civil engineering works

603 Sales of building construction

605 Sales of forests

606 Sales of property plant and equipment

607 Sales of compulsory stocks

609 Sales of other tangible fixed assets

610 Reimbursements and cost sharing from third parties

611 Investissement exemption taxes

623 Repayment of loans own companies

624 Repayment of loans mixed companies

625 Repayment of loans private institutions

626 Repayment of loans households

631 Repayment for civil engineering works

633 Repayment for building construction

639 Other repayment

640 Repayment of investment contributions Confederation

643 Repayment of investment contributions own companies

644 Repayment of investment contributions mixed companies

[1.00]   [1.00]   [1.00]   [1.00]   [1.00]

645 Repayment of investment contributions private institutions

[1.00]   [1.00]   [1.00]   [1.00]   [1.00]

646 Repayment of investment contributions household

[1.00]   [1.00]   [1.00]   [1.00]   [1.00]

660 Investment contributions Confederation

[1.00]   [1.00]   [1.00]   [1.00]   [1.00]

663 Investment contributions own companies

[1.00]   [1.00]   [1.00]   [1.00]   [1.00]

669 Other investment contributions

[1.00]   [1.00]   [1.00]   [1.00]   [1.00]

690 Balance to capital account

[1.00]   [1.00]   [1.00]   [1.00]   [1.00]

701 Acquisition of real estate land

[1.00]   [1.00]   [1.00]   [1.00]   [1.00]

702 Acquisition of real estate building construction

703 Acquisition of real estate with building lease

704 Acquisition of share of real estate

709 Acquisition and selling costs

710 Acquisition of movables

791 Report to capital account

792 Report to current account

801 Sale of real estate land

Capital Accounts

128 Advances for special financing

139 Accumulated deficit

200 Current liabilities
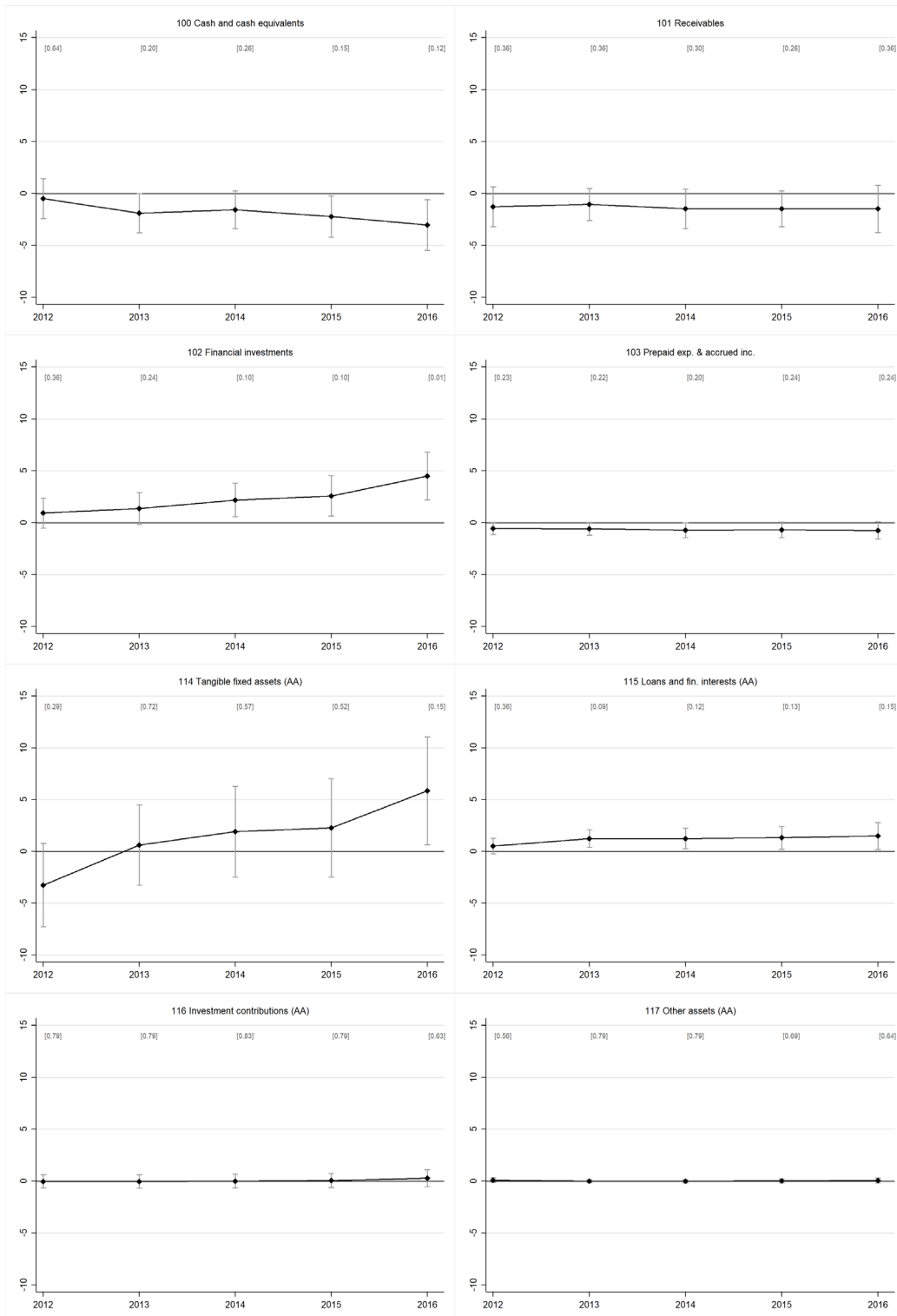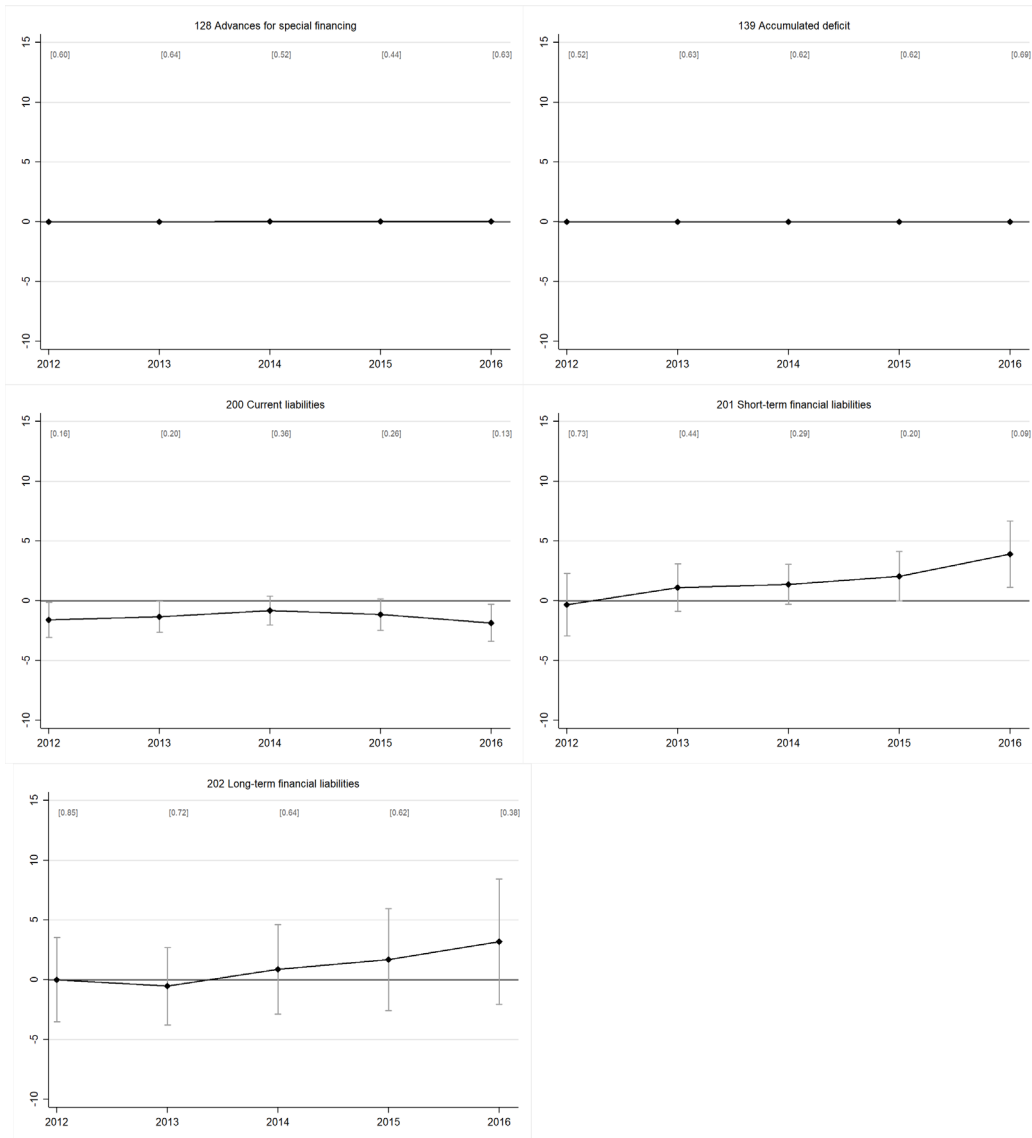
201 Short-term financial liabilities

202 Long-term financial liabilities

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