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Abstract:

This paper provides a discussion of stamp duty and its effects. This is followed by an empirical study using changes in the rate of stamp duty in the UK as natural experiments. Because shares will be affected differently depending on how frequently they are traded, we can employ a difference-in-differences methodology. We find that the announcements of cuts in stamp duty had a significant and positive effect on the price of more frequently traded shares compared to other shares. As expected under the efficient markets hypothesis, the implementation of cuts (when at a different date from the announcement) did not affect returns differentially.

Key words: Stamp duty, transaction tax, Tobin-tax, natural experiment, tax reform.

JEL classification: G14, H29, E62.

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Executive Summary

Stamp duty is a tax on share transactions in UK incorporated companies, currently levied at ½% of the purchase price of shares. This rate has been changed over the years, most recently in 1986 when it was cut from 1% to its current rate. In the 1990 Budget the Conservative government of the time announced its abolition to coincide with the introduction of the London Stock Exchange's new settlements system, Taurus. However, this was never implemented and stamp duty remains. Debate continues about whether stamp duty on shares should be abolished, and it is therefore useful to examine some empirical evidence on its effects.

If stamp duty is capitalised into share prices, it is expected to depress prices more for shares that are more frequently traded, and where future stamp duty payments are expected to be higher at any given rate. Past announcements of cuts in the rate of stamp duty allow us to test this prediction, by studying the effect of these announcements on share prices for groups of firms with different levels of trading. Data on trading volumes in the 1990s shows that firm size is a good predictor of share turnover rates. As this data on trading volumes is not available prior to 1986, our main results use firm size as a proxy for turnover. We also use data on actual turnover rates to check our results for the 1990 announcement of abolition.

We find evidence that stamp duty indeed has a detrimental effect on share prices. Specifically, the price of shares that are more frequently traded increases relatively to that of shares that are less frequently traded on the announcement dates of cuts in stamp duty in 1984, 1986 and 1990. The analysis of the events in 1986 is of particular interest, because in that year the actual cut took place around six months after the announcement. We find a significant effect only on the announcement date, not on the date of the implementation. This is the expected result in an efficient market, and provides some support for our empirical approach.

Stamp duty is thus shown to depress share prices, particularly for firms whose shares are frequently traded. This may increase the cost of capital faced by firms, which in turn could have negative repercussions on investment. Stamp duty also distorts the signals that share prices send about the profitability of firms, as share prices are also affected by expectations of future turnover volumes and stamp duty rates. Our results show that these effects are real and measurable. This finding is important both in discussion about the benefits of abolishing stamp duty, as well as for the wider debate on the merits of transaction taxes, including the controversial "Tobin –tax". It remains open, however, whether the negative effects of alternative sources of tax revenue would be smaller than those of stamp duty.

1 Introduction

This paper investigates the impact of UK stamp duty on share prices. Being a transaction tax, stamp duty on shares is controversial. Research on the effects of transaction taxes is therefore policy relevant. Not only because of the potentially large effect on stock markets, but also because of the wider discussion about the merits of introducing a transaction tax on international currency transactions (the "Tobin tax").[1]

For all the theoretical arguments on the effects of stamp duty, there is surprisingly little empirical evidence on the effects of stamp duty on share prices and turnover. The little that exists is summarised in section 3.2. Our approach is to use changes in the rate of stamp duty as "natural experiments". In particular, we use a difference-in-differences methodology, comparing the differential impact on the price of "low turnover" and "high turnover" shares of the announcements and implementations of stamp duty reductions in 1984, 1986 and 1990.

This paper is structured as follows. The next section describes the background of the current stamp duty regime and the changes made to it. Section 3 describes the theory of a transaction tax and briefly reviews the empirical evidence. Section 4 explains our empirical strategy to identify effects on share prices using tax reforms. Section 5 presents the results and section 6 concludes. An appendix discusses the effect of market movements on our results, and whether using abnormal returns would be appropriate in this context.

2 Background

Stamp duty is a tax on share transactions in UK incorporated companies, currently levied at ½% of the purchase price of shares.[2] It is chargeable whether the transaction takes place in the UK or

[1] The Tobin tax was first suggested in Tobin (1974).

[2] Strictly, stamp duty is chargeable on the purchase price of a share where there is a legal instrument of transfer. This accounted for around 10% of total revenue from share transactions in 2000–01. The remaining revenue was collected through stamp duty reserve tax (SDRT), which is the equivalent tax on an agreement to transfer the share where there is no written instrument of transfer. Since the introduction of an electronic settlements system, CREST, in 1996, SDRT has taken over as the main tax on share transactions.

overseas, and whether either party is resident in the UK or not. It is not chargeable on securities issued by companies incorporated overseas.

The rate of stamp duty has changed over the years. Before 1974 it stood at 1%. Then it was increased to 2%. In the 1984 Budget it was reduced to 1% again. In 1986 it was further reduced to its current rate of ½%. In the 1990 Budget the Conservative government of the time announced that stamp duty on shares would be abolished with the introduction of the London Stock Exchange's new settlements system, Taurus. However, in the end Taurus was abandoned in March 1993 and the abolition was never implemented.

One of the outstanding features of stamp duty is that it is the cheapest of all UK taxes to collect, with a collection cost of just 0.11 pence per pound raised. For comparison, the corresponding figure for income tax, the most important revenue raiser, is 1.59 pence (Inland Revenue, 2002). As the figure reported for stamp duty includes the cost of collecting stamp duty from land and property purchases, it is likely that the corresponding figure for stamp duty on share transactions is even lower, given that most transactions on the stock exchange are now electronic and stamp duty can thus be deducted automatically. The amount of revenue raised varies from year to year around an average of about £3bn,[3] which corresponds roughly to one tenth of that raised by corporation tax.

While stamp duty is in law levied on the purchaser of a share in a UK registered company, the true economic incidence of the tax, and therefore its effect on the economy, is ambiguous. In the long run, individuals will bear the tax either in lower returns on their savings, higher product prices due to lower investment, or a combination of the two. At the moment of introduction or unanticipated increase, the tax may fall predominantly on existing shareholders if share prices adjust to deliver the same expected post-tax returns as are available on substitute assets that are not subject to stamp duty. Therefore the beneficiaries of a cut in stamp duty are also most likely to be the current owners of shares that are liable to stamp duty.

[3] According to Inland Revenue Statistics, stamp duty on shares raised the following amounts during the last five years: £2.5bn (1998/99), £3.7bn (1999/2000), £4.5bn (2000/01), £2.9bn (2001/02) and £2.5bn (2002/03).

In recent years there has been increasing pressure from the London Stock Exchange and others for the abolition of stamp duty.[4] One of the principal arguments used to support its abolition is that stamp duty raises the cost of capital for UK firms and therefore reduces investment. In its calculations for the London Stock Exchange, OXERA (2001) estimated that stamp duty raises the cost of capital by 0.72 to 0.87 percentage points. This is calculated by deriving the implied impact of stamp duty on share prices and therefore company discount rates.

In practice, the effect on investment may depend on the marginal source of finance for different types of firms. For firms whose marginal source of finance is retained earnings or new equity, we would indeed expect stamp duty to raise the cost of capital. This is because it is levied on the share price, which includes the capitalised value of retained profits that have not yet been paid out to shareholders. Hawkins and McCrae (2002) calculate that stamp duty at its current rate could add between 0.15 and 0.65 percentage points to the cost of retained earnings finance, depending on the frequency with which a company's shares are bought and sold. For other firms, i.e. those whose marginal source of finance is debt, the effect on their cost of capital may be less important.

3 Economic effects of securities transactions taxes

The potential effects of stamp duty are wide-ranging. It may affect share prices, as investors will price in future payments of this transaction tax. It may also affect trading volumes, as the difference between the valuation of a prospective buyer and seller needs to be larger to cover not only general transaction costs, but also the amount of stamp duty.[5] Furthermore there may be effects on volatility, which could be reduced if the latter effect prevented trading when valuations change only marginally, although it may also increase, because adjustments will take

[4] E.g. London Stock Exchange "Urgent action on Stamp Duty needed to boost the economy" Press Release 24 March 2003. See also Stamp Out Stamp Duty Campaign at www.stampoutstampduty.co.uk.

[5] Empirical evidence has consistently found such a negative relationship, see Jackson and O'Donnell (1985), Lindgren and Westlund (1990), Ericsson and Lindgren (1992), Aitken and Swan (2000) and Swan and Westerholm (2001)

place more suddenly.[6] While all of these effects may be important, the focus of this paper is on the effect on the share price.

3.1 Theoretical impact of a transactions tax on share prices

According to the standard dividend valuation model,[7] the equilibrium price of a share should be equal to the expected present discounted value of future distributions after all taxes. In the special case where the dividend per share grows at the constant rate g and the discount rate r is also constant, the price P is given in the absence of transaction taxes by:

$$P = \frac{D}{1+r} + \frac{D(1+g)}{(1+r)^2} + \frac{D(1+g)^2}{(1+r)^3} + ... = \frac{D}{r-g}$$

where D is the dividend per share paid at the end of the current period, and r - g is the dividend yield.

Stamp duty can be incorporated into this simple model by assuming a fixed number of transactions t per period, so that the price in the presence of stamp duty becomes:

$$P = \frac{D-stP}{1+r} + \frac{(D-stP)(1+g)}{(1+r)^2} + \frac{(D-stP)(1+g)^2}{(1+r)^3} + ... = \frac{D-stP}{r-g}$$

$$= \frac{D}{r-g+st}$$

where s is the rate of stamp duty.

To calculate the effect of an unanticipated permanent change in the rate of stamp duty, we make the additional assumptions that the change in the stamp duty rate does not affect turnover, the discount rate or the growth rate of dividends. The proportional change in price implied by a change in the rate of stamp duty from s to s' is then given by: $\frac{P'-P}{P} = \frac{(s-s')t}{r-g+s't}$.

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[6] Empirical evidence on the effect on volatility has been rather mixed. Umlauf (1993) and Saporta and Kan (1997) found no effect, Aitken and Swan (2000) and Swan and Westerholm (2001) found that transactions taxes tend to increase volatility and Hau and Chevallier (2000) found that they slightly reduce it.

[7] See, e.g. Brealey and Myers (2000).

In the special case of the abolition of stamp duty (*s' = 0*), this simplifies to $s\left(\frac{t}{r-g}\right)$ and the assumption that stamp duty has no effect on share turnover becomes unnecessary. Table 1 shows the increase in share prices predicted by this simple model if the current stamp duty rate of 0.5% were to be abolished, for a range of shares with different turnover rates and dividend yields. The higher the frequency of transactions, the more stamp duty would be saved in the future by shareholders as a result of its abolition, and the higher is the predicted increase in the current share price. This basic prediction holds for cuts in the rate of stamp duty more generally, provided the turnover rate increases less than proportionately as the rate of stamp duty is reduced.[8] This is the key prediction that we test in our empirical analysis.

Table 1: Predicted share price impact of abolishing stamp duty

Dividend yield	*Turnover*		
	10%	30%	50%
2%	2.5%	7.5%	12.5%
3%	1.7%	5.0%	8.3%
4%	1.3%	3.8%	6.3%

In practice, there are a number of reasons why the observed price impact of abolishing stamp duty could differ from that predicted by this simple model. For instance, investors may not expect the abolition to be permanent, which would reduce the predicted impact on price. In cases where the rate is cut rather than abolished, an increase in turnover would partially offset the effect of the lower tax rate on price, although this in turn may produce an offsetting effect through market liquidity. That is, investors may require a lower risk premium from shares that are traded in a more liquid market, which would tend to reduce the discount rate, *r*.

We would also expect many factors other than the rate of stamp duty to affect a company's share price. In principle, any "news" that affected investors' expectations of future profits, or their expected post-tax return on other assets (real discount rate), would potentially change the share price. Examples of such news might include announcements of recent profits or updated analysts' forecasts of future profits, changes in macroeconomic policy that may affect future real

[8] That is, provided a 50% reduction in the rate of stamp duty, from say 0.5% to 0.25%, would not produce a 50% increase in the number of transactions.

interest rates or the volatility of inflation, or a new invention that changed the relative cost of a company or opened up a new market for its products. The empirical challenge is to identify the effect of a stamp duty rate change given that there are so many other influences on share prices.

3.2 Review of empirical evidence

The following provides a brief review of both UK and international empirical work on the effects of stamp duty or equivalent foreign transactions taxes.

3.2.1 Evidence from the UK

Despite the changes in stamp duty tax rates and the debate surrounding them, there is not very much UK empirical work. Jackson and O'Donnell (1985) estimate the impact of transaction costs on average real share prices over the period 1963–84 using aggregate annual data for the UK stock market. They find an elasticity of share price with respect to transaction costs of –0.23. If true, this implies that the 1984 reduction in the stamp duty rate from 2% to 1% would have led to an 8% rise in share prices.[9]

Saporta and Kan (1997) look at the share price impact of changes in the rates of stamp duty by observing share price movements on the days that the last three rate changes were announced in the UK in 1974, 1984 and 1986. They find that share prices moved in the expected direction and by a statistically significant amount. However, as noted by Saporta and Kan, the change cannot be directly attributed to changes in stamp duty, because other information may have been hitting the market on the same day, particularly as the announcements were made on budget days.[10]

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[9] Jackson and O'Donnell estimate that other transaction costs were 0.75% of transaction values. This implies that total transaction costs were 2.75% prior to the stamp duty cut in 1984. The effect of a 1 percentage point cut in stamp duty on prices can then be calculated as the share price elasticity times the percentage change in transaction costs, i.e. –0.23× (1%/2.75%)= 8.4%.

[10] They also try to learn something from comparing the impact on shares traded in the UK and stamp duty free American Depository Receipts (ADR). This is made difficult by arbitrage, which will lead to similar prices between the two assets. Nevertheless their results are as expected (i.e. returns on ADRs are higher after announcements of tax cuts) but this difference is not significant. Because of very small sample sizes (between 4 and 11 firms) they should anyway be treated with caution.

3.2.2 Overseas evidence

Related evidence has also been presented for other countries. Umlauf (1993) employs a similar methodology to that in Saporta and Kan to consider the effect of the imposition of a 1% tax on Swedish share transactions in 1984. He finds that the share price index declined by 5.3% during the month of the announcement, compared with a predicted 6.75% decline. However, his paper is subject to the same criticism as Saporta and Kan's – namely, that it fails to control for other possible influences on share prices such as interest rate changes and other tax changes.

Swan and Westerholm (2001) attempt to identify the share price impact of the abolition of securities transaction taxes in Sweden and Finland in 1991 and 1992 respectively. In order to allow increases in turnover due to lower transaction costs to have an additional positive impact on share prices through improvements in liquidity, they first model the effects on share turnover of changes in transaction costs due to tax changes. They use pooled daily data for roughly a two-year period either side of the tax change for 30 Finnish stocks and 80 Swedish stocks. They attempt to correct for other influences on share prices by including control variables such as interest rates and exchange rates. They also estimate equivalent aggregate equations for the whole market and separate equations for different sub-samples of stocks. This allows them to test whether transaction taxes impact differentially on turnover of stocks in small and large companies, which may differ in terms of liquidity and other transaction costs.

They estimate that the elasticity of share prices with respect to transaction costs is –0.20 for Sweden and –0.21 for Finland. These are similar magnitudes to those found by Jackson and O'Donnell for the UK. If the true elasticity for the UK is around –0.2 and transaction costs are between 1% and 3% of transaction values, this implies that a 0.5% cut in stamp duty would increase share prices by between 3.5% and 14% – a similar range to that presented in Table 1.

4 Methodology

We follow a different approach to the existing literature by using a difference in differences approach, in which we use changes in stamp duty rates over time, and announcements thereof, as "natural experiments". Specifically, from the simple model of share prices outlined above, we would expect the price impact of a given change in the rate of stamp duty to be greater for stocks

that have high turnover than for those with low turnover, other things being equal. By splitting stocks into high and low turnover categories, in principle this enables us to test whether stamp duty does indeed affect share prices in the way predicted by the model.

4.1 Econometric specification

The approach that we start with is a basic difference-in-differences specification, as follows:

$$r_{it} = \alpha + \beta_1 D_i^1 + \beta_2 D_i^2 + u_{it}$$

where r_{it} is the rate of return on a share i at time t, D_i^1 and D_i^2 are dummy variables and u_{it} is a random error.

There may be more than two dummies, but they will always be defined in the same manner: whenever D_i^1 equals one, D_i^2 will also equal one, i.e. D_i^2 determines the additional effect of being in group 2 for firms that are already in group 1. E.g. when firms are grouped according to size, D_i^1 will be one for all firms above a certain size and D_i^2 will be one for all firms above an even higher size threshold.

The coefficients are then interpreted as follows. α will be the average return on all shares not in a group defined by one of the dummies. β_1 gives the additional return on shares, which are in that group defined by D_i^1, compared to the "control group" of shares not defined by either of the dummies. β_2 will give the additional return on shares that are in the group defined by D_i^2 only, relative to all the shares in the group defined by D_i^1. The sum of β_1 and β_2 would thus be the additional return of shares in the group defined by D_i^2 relative to shares not in D_i^1.

We measure r_{it} as the cumulative total return over the period (event window). This includes both dividends and capital gains, although in most cases there are no dividend payments during the relatively short event windows.

4.2 Events considered

The four events that we use as natural experiments are the three announcements of stamp duty cuts in the Budgets of 1984, 1986 and 1990, and the implementation of the 1986 cut six months after its announcement. If the stock market were reasonably efficient, in the sense that new information about or affecting a firm's valuation is reflected in its share price soon after it is revealed to the market, we would expect the main effect of a stamp duty cut on share prices to take place immediately after the announcement date. There should be no effect on the date of the implementation. In practice, the dates of announcement and implementation were the same in 1984. In 1986, the rate cut was announced before it was implemented although there was some uncertainty surrounding the precise date of implementation, as it was to coincide with the "Big Bang".[11] The final event considered was John Major's announcement in Budget 1990 that stamp duty would be abolished with the introduction of Taurus.[12] This proposal was never actually implemented, as the Taurus project was eventually abandoned. Hence, if the initial announcement had any credibility we would expect share prices to adjust in March 1990, after which point the effect would presumably unwind as it became clear to market participants that Taurus would never become operational. The details of the three announcements and the subsequent implementations of the rate cuts are summarised in Table 2 below.

Table 2: Key dates and details of stamp duty rate changes

Announcement date	*Implementation date announced*	*Actual implementation date*	*Old rate*	*New rate*
13 March 1984	13 March 1984	13 March 1984	2%	1%
18 March 1986	Autumn 1986	27 October 1986	1%	½%
20 March 1990	Late in 1991/92 (1)	Not implemented	½%	0%

(1) The Budget costing assumed abolition from 1 January1992.

Around each announcement date we consider event windows with different start and end dates and varying durations. Budget speeches were delivered to Parliament in the afternoon on the dates in question. We focus on an event window commencing at close of trading the day before

[11] The date from which share transactions on the London Stock Exchange would be settled using CREST.

[12] Taurus was the intended replacement for the Talisman settlements system. It was abandoned in March 1993.

the announcement.[13] It is not clear whether market participants would have had sufficient time to react fully to the announcement on the day in question. Allowing a longer time period for the market to react would increase the likelihood of picking up the full price impact of the stamp duty announcement in our data, but would at the same time increase the risk that we would also be picking up the effects of extraneous items of news completely unrelated to stamp duty. We consider event windows stretching from one to up to five trading days after the announcement.

4.3 Identification of low- and high-turnover stocks

Datastream provides daily data on the volume of shares traded after Big Bang (October 1986) for stocks where, on average, 2000 or more shares are traded daily. Since three of the four events that we are considering took place before or on the same date as Big Bang, we are unable to use this turnover data to group stocks by actual turnover in those cases. In our main results we therefore use market capitalisation as a predictor of turnover.

To justify this methodology we examine the relationship between trading volumes and market value during the period in which we do have data. We define a turnover rate as the fraction of outstanding shares traded in a year. First, we rank stocks where we have both market capitalisation and turnover data by market capitalisation in each year from 1991 onwards (the period where the sample size exceeds 500).[14] Figure 1 plots the average annual turnover rates for four groups of stocks grouped by market capitalisation.[15] It shows that the average turnover rates of stocks in groups with higher market capitalisation is consistently higher than that of groups with lower market capitalisation.

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[13] It is possible that rumours may have leaked out prior to the announcement, but their credibility would have been suspect.

[14] For producing these charts we have dropped any firms that had less than 50 observations per year or less than 4 years of data. Firms with trading ratios less than 1% per year are likely to have unreliable price date, because of an illiquid market, and were also dropped. Finally we dropped firms with trading ratios in excess of 200%, because of doubts over the reliability of their data.

[15] The figure shows the unweighted average. A very similar chart is obtained if averages are weighted by market value, except that in the first three years, the weighted average turnover rate of the top 100 firms is slightly below that for the following group (101^{st} to 250^{th} firm). A fraction of shares traded equal to 1 (or a trading ratio of 100%), indicates that the annual number of transactions is equal to the number of shares outstanding.

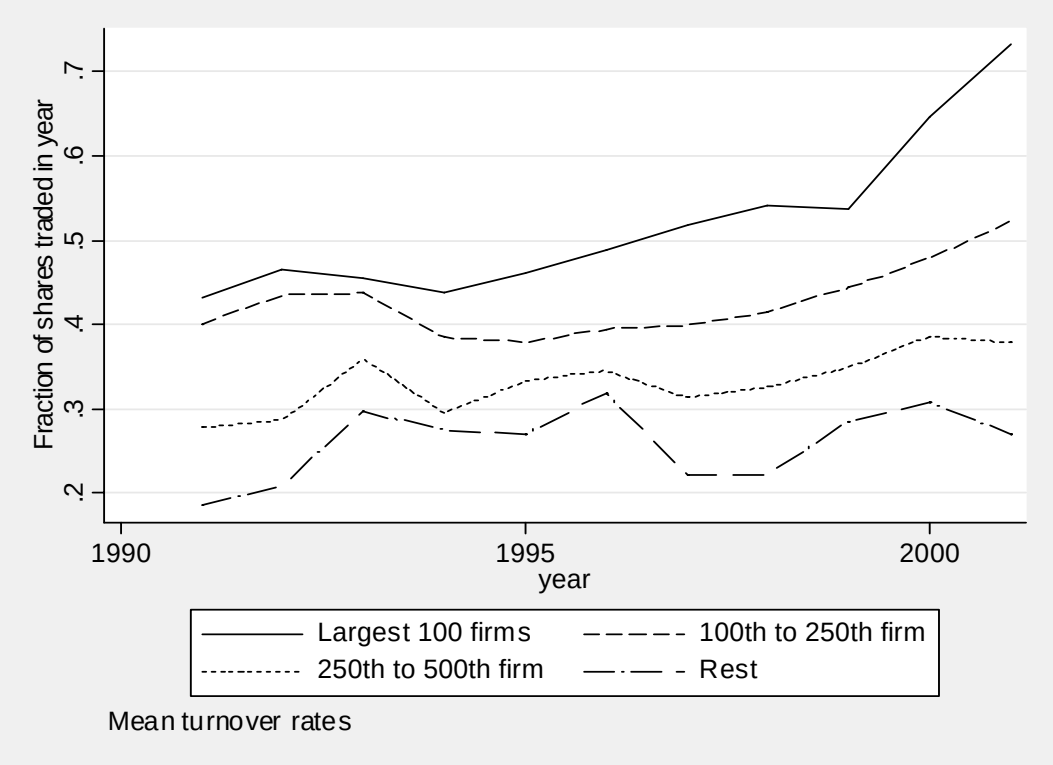

Figure 1: Average turnover of stocks in different size classes in a given year

In order to avoid problems of endogeneity, we also show that ranking by market capitalisation in period t-1 is a good predictor of a stock's ranking by share turnover in period t. Table 3 shows that market capitalisation is a good predictor of turnover in the 1990's, both for the current period and for one period ahead.

Table 3: Ranking by size in year t-1 as a predictor of ranking by turnover in year t-1 and t

Market capitalisation at t-1	*Average annual turnover at t-1*	*Average annual turnover at t*
top 100	.528	.509
	(.011)	(.010)
101 – 250	.429	.425
	(.007)	(.007)
251 – 500	.337	.325
	(.005)	(.005)
Rest	.267	.275
	(.004)	(.004)

Notes: Robust standard errors given in parentheses.

An alternative way to identify high-turnover stocks would be to use turnover data from the 1990s to allocate firms to groups and then to assume that turnover rates remain constant over time.

Table 4 shows the correlation between turnover rates (turnover / market value) at different time intervals. We see that there is a high correlation between adjacent periods, but this correlation becomes lower as we consider periods that are farther apart. This suggests that using turnover data from later years may work for the 1990 announcement of the abolition of stamp duty, but it cannot be justified for any of the earlier changes.

Table 4: Correlation between stock turnovers at various dates[16]

	t	*t-1*	*t-2*	*t-3*	*t-4*	*t-5*	*t-6*	*t-7*
t	1.00							
t-1	0.64	1.00						
t-2	0.55	0.73	1.00					
t-3	0.48	0.56	0.72	1.00				
t-4	0.45	0.52	0.60	0.78	1.00			
t-5	0.43	0.52	0.58	0.68	0.79	1.00		
t-6	0.39	0.49	0.56	0.64	0.72	0.80	1.00	
t-7	0.37	0.46	0.53	0.60	0.65	0.71	0.83	1.00

Our preferred indicator of turnover therefore is the average market capitalisation in the period preceding the event, which appears to be a good predictor of turnover in the current period during the 1990's. Unfortunately we are unable to test whether the same is true for the 1980's because the data are either unavailable prior to 1991 or scarce.[17] Nevertheless, we proceed on the basis that the relationship between market capitalisation and turnover during the 1980's was similar to that observed in the 1990's. If this were not the case, and size were a less good predictor of turnover in the 1980's, then if anything our results would tend to be biased against finding a differential impact of stamp duty cuts on the market value of high turnover stocks. This is because each size grouping would contain a mixture of low- and high-turnover stocks, biasing the estimated coefficient on stocks classified as "high turnover" towards zero.

[16] Each correlation was calculated from the same sample of 1531 observations, therefore the coefficients are comparable.

[17] Some data are available from 1986 onwards, but for less than 500 companies, which is not sufficient for our approach of grouping firms into four size bands.

5 Empirical results

This section summarises the main results for each event referred to earlier. We first present the results using size as a proxy for turnover rates, as this approach is possible for all the dates we consider. We then show, for the 1990 announcement, additional results using the actual turnover data.

5.1 Results using size as a proxy

Table 5 shows the results from regressing the cumulative return from the day before to the day after the event on size dummies. These dummies are defined as follows: The dummy labelled "largest 500" is one for each firm that belongs to the largest 500 firms of the sample. A positive co-efficient thus indicates that the largest 500 firms experienced higher returns over the relevant period than the smaller ones. The next dummy, "largest 250", equals one, for firms that are among the 250 largest ones. The coefficient thus tells us how much larger (or smaller) the returns of the 250 largest firms are compared to the group of the 500 largest. The remaining dummy "largest 100" is defined similarly. Table 6 shows the same regressions but for a cumulative return over a longer time interval, from the day before the reform to five days after.

Table 5: Results of regressions of two-day return (t-1 to t+1) on size bands.

	Date of stamp duty change announcement / implementation			
Dep var: Return	13 March 1984 (announcement and implementation)	18 March 1986 (announcement)	27 October 1986 (implementation date)	20 March 1990 (announcement)
	(1)	(2)	(3)	(4)
Largest 100	0.004	0.004	-0.001	0.004
	(0.004)	(0.004)	(0.003)	(0.002)**
Largest 250	0.001	0.005	-0.002	0.005
	(0.003)	(0.003)**	(0.002)	(0.002)***
Largest 500	0.005	0.007	0.003	0.001
	(0.002)***	(0.002)***	(0.002)*	(0.001)
Constant	0.007	0.003	0.004	-0.006
	(0.001)***	(0.001)***	(0.001)***	(0.001)***
Observations	1372	1347	1356	1426
R-squared	0.02	0.04	0.00	0.02
F-statistic	5.86	15.87	1.15	14.39

Robust standard errors in parentheses

** significant at 10%; ** significant at 5%; *** significant at 1%*

Table 6: Results of regressions of one-week return (t-1 to t+5) on size bands.

	Date of stamp duty change announcement / implementation			
Dep var: Return	13 March 1984 (announcement and implementation)	18 March 1986 (announcement)	27 October 1986 (implementation date)	20 March 1990 (announcement)
Largest 100	0.016	0.010	-0.008	0.009
	(0.007)**	(0.007)	(0.008)	(0.005)*
Largest 250	-0.003	-0.005	0.001	0.009
	(0.005)	(0.006)	(0.007)	(0.004)**
Largest 500	0.017	0.010	-0.004	0.003
	(0.003)***	(0.004)**	(0.005)	(0.002)
Constant	0.015	-0.008	-0.015	-0.009
	(0.002)***	(0.002)***	(0.002)***	(0.001)***
Observations	1372	1347	1356	1426
R-squared	0.03	0.01	0.00	0.02
F statistic	15.59	2.94	1.16	13.05

Robust standard errors in parentheses

** significant at 10%; ** significant at 5%; *** significant at 1%*

The results are broadly as predicted by theory. We find that the shares of larger firms, which are on average more frequently traded, earn higher returns than those of smaller firms, at the time that reductions are announced, though not on the implementation date of the 1986 rate cut. The precise pattern across size bands is not always the same. Depending on the event and on the event window, different size dummies may have significantly positive coefficients. Generally the

difference between the largest 500 firms and the remaining firms tends to be more significant than differences within the group of the largest 500 firms, except in 1990 when the greatest effect was seen for the largest 250 firms.

The general absence of differential price impacts around implementation date of the 1986 rate cut is reassuring, because, under the assumption of efficient markets, the benefit of a lower stamp duty rate should have been priced in at the time of announcement.

The results for the 1990 announcement are also interesting. We find a strong price impact in the expected direction, suggesting that the market considered the announcement of the abolition to be credible.

5.2 Results using share turnover volume data

As mentioned above, turnover volume data are generally available from 1991 onwards. For some firms, however, with average turnover in excess of 2000 shares per day, they become available from late 1986 onwards. It is therefore possible to use these data directly to allocate firms into turnover bands, at least for the 1990 event. The data are scarce though: we have sufficient volume information for 166 firms only. These are all relatively large firms. 96 of the 100 largest firms are included in this group and more than three quarters of these 166 firms are among the largest 150 firms. Given the limited number of observations on volume data, we split these firms into only two groups at the median turnover rate (defined as turnover divided by market value) within this sample. As well as comparing the returns of the most heavily traded firms to the remaining firms with trading volume data, we can also compare the return of all firms with volume data to those without, because we know that only firms with frequently traded shares will have volume data for this period. The results of regressions of cumulative returns over two days and one week are shown in columns (1) and (2) of Table 7.

Table 7: Results of regressions of cumulative return on turnover band around March 1990 announcement.

	(1)	(2)	(3)	(4)
	Cumulative return (t-1 to t+1)	Cumulative return (t-1 to t+5)	Cumulative abnormal ret. (t-1 to t+1)	Cumulative abnormal ret. (t-1 to t+5)
turnover rate > median	0.004	0.002	0.002	-0.001
	(0.003)	(0.006)	(0.003)	(0.006)
has turnover data	0.004	0.011	0.004	0.010
	(0.002)**	(0.005)**	(0.002)**	(0.004)**
Constant	-0.005	-0.007	-0.007	-0.012
	(0.001)***	(0.001)***	(0.001)***	(0.001)***
Observations	1426	1426	1348	1348
R-squared	0.01	0.01	0.01	0.01
F-statistic	8.03	6.75	5.82	4.22

Robust standard errors in parentheses
** significant at 10%; ** significant at 5%; *** significant at 1%*

These results confirm that firms whose shares have higher turnover rates benefited from relatively higher rates of return around the March 1990 announcement of the abolition of stamp duty. The difference within the group of highly traded firms with volume data is small compared to the difference between all highly traded firms and the rest of the market.

Another experiment that we can do with the volume data is to repeat the regression using abnormal returns rather than total returns as the dependent variable. While this was not appropriate when using size as the grouping variable (see Appendix), there is less reason why this should be uninformative when we use actual volume data. Indeed columns (3) and (4) reveal that the results with abnormal returns are very similar to the results using total returns.

6 Summary and conclusion

In this paper we have analysed the effect of changes in stamp duty rates on share prices. We find that stamp duty clearly depresses share prices, particularly for firms with more frequently traded shares. This may increase the cost of capital faced by firms, which in turn could have negative repercussions on investment. Stamp duty also distorts the signals that share prices send about the profitability of firms, as share prices are also affected by expectations of future turnover volumes and stamp duty rates. Our results show that these effects are real and measurable. This finding is

important both in discussion about the benefits of abolishing stamp duty, as well as for the wider debate on the merits of transaction taxes, including the controversial Tobin-tax. It remains open, however, whether the negative effects of alternative sources of tax revenue would be smaller than those of stamp duty.

Appendix: Abnormal returns

It is common in event studies to use either a statistical or economic model to control for changes in share prices that were caused by factors unrelated to the events studied (see MacKinlay, 1997). The most widespread method is to focus on abnormal returns by calculating for each share its normal correlation with market movements ("beta"), and then focussing on any return in excess of that explained by market movements.[18]

The event studied in this paper differs fundamentally from the events analysed in most event studies, as it affects all shares (although to different degrees) rather than just a few. Unlike in other event studies, the event itself will thus have a considerable impact on the market return. To see this more clearly, consider the following equation, specifying the relationship between the return on a share and the market return:

$$r_i = R_i - \beta_i r^m$$

where r_i is the abnormal return, R_i is the total return, r^m is the market return and β_i is the historical correlation between the market and individual returns.

In an event study the aim is usually to identify the effect caused by the event, rather than by other information hitting the market on the same day. In most studies this is straightforward, as the event will have (virtually) no effect on the market return. A merger announcement, for example, is unlikely to affect the market return, as long as the merging firms are small relative to the market. In these cases the impact of the event on the return is simply the abnormal return.

If however the event being studied has a substantial impact on the market return, and particularly if the β_i vary systematically with the characteristics of the different groups of firms being considered, this approach can give a misleading impression of the impact of the event on the share prices of different groups of firms. This concern in present in our context, as we illustrate below.

[18] Although this method is widespread, it has not been used in empirical studies of stamp duties. These studies have either focussed on total returns, or in the case of OXERA (2001) on total returns in excess of the market return, but without allowing the impact of the market return to differ by firms, i.e. assuming beta=1 for all firms.

The difference-in-differences approach, which restricts its attention to relative differences in return, makes the calculation of abnormal return unnecessary as long as market betas are not systematically different across groups. So the discussion above might appear unnecessary. However, when we calculated betas and compared them to the size distribution, we found that they are clearly increasing in size, as is demonstrated in Table 8.

Table 8: Betas by firm size 1990

Rank of firm	*1-100*	*101-200*	*201-300*	*301-400*	*401-500*	*501-600*	*601-700*	*701-800*	*801-900*	*901-1000*
Avg. beta	1.08	0.92	0.63	0.66	0.64	0.57	0.52	0.56	0.57	0.51
S.e.	0.02	0.03	0.03	0.03	0.03	0.03	0.02	0.03	0.03	0.03

Notes: Betas calculated by regressing daily returns of individual shares on the returns of the FT All Share index over the year prior to the 1990 event.

The findings from Table 8 suggest that there is a fundamental difficulty: If betas are increasing in size, and share turnover is too, then it is difficult to distinguish between a positive aggregate shock to the stock market and a change to stamp duty, because both would cause differentially higher returns for the shares of larger firms.

Unfortunately using abnormal returns does not provide a solution to this. Suppose there is an announcement of the abolition of stamp duty (as in 1990). Assume for simplicity that on this day nothing else happens on stock markets and that the market return will only be positive because of this event. Table 9 shows the abnormal returns one would expect to see in that case.

Table 9: Theoretical abnormal returns (1990)

Size band	*Turnover rate*	*Expected return*	*MV share*	*Market return*	*beta*	*Abnormal return*
Top 100	0.55	6.8%	74.1%	6.3%	1.08	0.00%
101-250	0.44	5.5%	15.3%	6.3%	0.82	0.33%
251-500	0.35	4.3%	6.4%	6.3%	0.65	0.21%
rest	0.27	3.4%	4.2%	6.3%	0.51	0.16%

Turnover rates are increasing in size, as documented in section 4.3. The expected returns for each size group are calculated as in Table 1, assuming a dividend yield of 4%. Using the share of the market value made up by each size group, the market return is obtained. Clearly this is mainly driven by the effect on large firms. The betas are calculated for each size group and are

increasing in size. Applying then the formula for the abnormal return, we find that the largest firms had the lowest abnormal return.

Concluding from this that they had not been affected by the stamp duty cut would be a mistake, as by assumption the stamp duty cut was the only event occurring. The problem is that the largest group primarily drives the market return. At the same time, with a beta close to one, almost all of the effect is subsequently deducted.

For practical purposes this means that if one is studying an event with important effects on market returns, focussing on differences across firms in abnormal returns may be misleading. If betas differ across groups, then this will even affect difference-in-differences regressions. In the particular case of differences by firm size, since betas are increasing in firm size, the entire effect can be wiped out if using abnormal returns. In the opposite case of decreasing betas, the effect would be overstated. It may therefore be preferable to use total returns, particularly if the market return over the period is to a large extent driven by the event being studied. This is the reason why this paper has used total returns, as have all other papers in this literature,[19] though without providing an explanation. In principle this argument also holds for regressions using actual trading volume data to group firms. However, because the correlation between size and trading volume is not perfect, it is possible that abnormal returns will not be fully eliminated by the mechanism described above. Indeed, in our regressions based on volume data, we find that this is case (see section 5.2).

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