

FINANCIAL TRANSACTION TAXES

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1. INTRODUCTION

It is sometimes argued that because it would be hard to design a financial transaction tax that would be completely immune from the ill-placed ingenuity of bankers, there is no point to doing so. This is a far tougher benchmark than we apply to almost any other tax. One of the principal sources of tax revenues in the United States is income tax. The last study by the IRS suggested that non-compliance with the tax code amounted to \$345bn - equivalent to 18-19% of income – which was not properly reported to the IRS. More recent studies suggest this number has grown to \$500bn², but this is not widely seen as cause for abandoning income tax collection altogether: 82% compliance is not as good as it should be, but the \$2,000bn that is raised through income tax and spent by the US government is not to be given up as a result.

In a similar vein, few taxes leave no distortions, or on their own, have no drag on the taxed activity. The issue is to consider new taxes under conditions of fiscal neutrality and design taxes that under these circumstances limit negative distortions and, where possible, favor positive ones. In this paper, we first examine the effects of an FTT on the level of GDP - starting from estimates made by the European Commission, and then modify them to include important elements that are omitted. We then address some of the practical criticisms of FTTs and suggest how best to design an FTT that minimizes negative distortions, is hard to avoid, but nevertheless raises significant sums.

2. THE IMPACT OF FTT ON GROWTH AND THE EU COMMISSION REPORT

In what follows we will examine the effects of an FTT on GDP growth. We will first summarize (in section 2.1 and below) the estimates prepared by the European Commission in its initial report.

Once the Commission introduced all the mitigating elements to its model, it came up with an estimate of a total long run loss of GDP of -0.53% as a result of the FTT (section 2.2). It is critical to note that there has been a recent updating of the model used by the Commission prepared by the same authors who did the original modeling (Lendvai and Raciborki, 2011). This updated model attempts to reflect more realistically the funding of investment by companies in general and European companies in particular, with a relatively low level of funding via the stock market, and a higher share via bank loans and retained profits. This more realistic model gives a far lower estimate for impact of FTT on level of GDP, equal to only -0.2%. If all other effects, proxied by the Commission in its previous analysis are added, the impact of FTT on level of GDP is equal to -0.1%.

However, the Commission estimates are based on a model that even in this revised form is incomplete, and excludes some of the crucial positive impacts. Some of these positive effects through which an FTT could increase growth are particularly relevant in current circumstances, but others are more general. In section 2.3 we examine those positive impacts, and conclude that they are more than likely to compensate the negative effects so the impact

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² See Richard Cebula and Edgar Feige “America’s Underground Economy: Measuring the size, Growth and Determinants of Tax Evasion in the US. (<http://www.ssc.wisc.edu/econ/archive/wp2011-1.pdf>)

of introducing an FTT on level of GDP, all things considered, is likely to be positive, at around +0.25% - as a minimum. Indeed, our analysis suggests that the overall positive impact on growth could be higher, and we identify a number of channels through which the FTT could support sustained growth. Outside of economic models, there are a great many factors that contribute, directly and indirectly, to growth and it is important not to exaggerate the effects of the FTT alone. Furthermore, it is certainly the case that many of the countries that do have FTTs have not been growth laggards, such as: South Korea, Hong Kong, India, Brazil, Taiwan, South Africa and Switzerland. On the contrary, they have been amongst the fastest growing economies in the world.

2.1 The Commission model and its estimates

The use of Dynamic Stochastic General Equilibrium (DSGE) models, as adopted by the European Commission, is one way of estimating the macroeconomic effects of policy changes. The European Commission points out that their advantage over sector specific Partial Equilibrium Models is that they fully take into account spillover effects to other sectors as well as second-round effects triggered by a policy change, including the effects of the recycling into the economy of higher tax revenues. It has, however, several disadvantages. One possible disadvantage pointed out by the Commission itself is that they typically have less detailed sectorial breakdown of the economy than partial equilibrium models.

Using a DSGE-model, the Commission represents the FTT as an increase in the corporate income tax, reducing the (after tax) rate of return of investment and, thus, dampening investment activities. This approach neglects the critical difference in the incidence of the transaction tax caused by the different holding periods of the investor - the average pension fund turns over only half of its portfolio every two years. This approach also makes the rather strong assumption that the financial sector is similar to other corporate sectors, or that this sector is in any case able to pass on the higher costs/taxes to its clients in other sectors. This can be disputed. If the financial sector is as competitive as many bankers argue, it may absorb at least part of the costs of the tax. Furthermore, in such models the corporate income tax is assumed to be the economically most distorting tax as it has strong negative knock-on effects on investment and, consequently, on economic growth.

This is particularly inappropriate in the current context when many European economies are trapped in a recession/low growth scenario with high unemployment and where private investment is discouraged by lack of confidence (animal spirits) and low aggregate demand. These circumstances are likely to swamp the effect of a 0.1% change in corporate taxes. The “normal” mechanisms linking taxes through the investment channel to lower long term growth do not operate in the same way, and may not do so for several years, as investment and growth will be low anyway. Furthermore, the Commission model, which focuses more on aggregate supply (and its determinants, especially via levels of investment) and does not include aggregate demand effects via both investment and consumption, therefore omits sufficiently including such positive effects of the FTT on consumption, which we discuss immediately below.

If the FTT replaces another tax, meaning it is fiscally neutral, and the FTT is more progressive than the other taxes, it could lead to an expansion of total aggregate demand for consumption, if - as is normally the case - lower income groups have a higher marginal propensity to consume than relatively richer groups. Such an expansion of aggregate consumption demand would have a positive effect on level of GDP, which is entirely neglected by the Commission model

In the European Commission's QUEST-III model, fiscal consolidation is supposed to be the primary use of revenue raised from higher taxes. This could be a very positive possible use of the FTT, especially in the current circumstances of high government debt and high fiscal deficits in many European countries. Fiscal consolidation could therefore reduce the cost of government debt, and as many European institutions including the ECB and Commission tell us, this could help crowd-in private investment. Yet these positive effects, effects that much of current European economic policy choices are based on, are not included in the Commission estimates.

Furthermore, as discussed below, there are two other alternative ways to examine this, depending on the use of the FTT: one is to consider the tax in the context of fiscal neutrality. For example the FTT could replace another tax - the latter itself would have had negative growth impacts. Therefore the total impact on level of GDP would arise from comparing the net effects of the negative effect on level of GDP of the replaced tax with those of the FTT. A second alternative use of the FTT is for the increase in tax revenue to increase government investment, which could have both short term (aggregate demand) and long term (supply) positive effects on growth that would have to be compared with the potentially negative effects of the FTT on growth examined in the Commission model.

In its work to assess the macroeconomic impacts of a financial transaction tax specifically, the European Commission's economists developed a new dynamic stochastic general equilibrium (DSGE) model. This model is an attempt to simulate the effects of a specific subset of financial transaction taxes, i.e. a tax on securities (STT). Whereas this model has merit and provides an initial benchmark, it still has some limitations which should be taken into account when interpreting the results, many of which are recognized by the European Commission itself. The Commission model does not take account of relocation effects, neither does it allow for an analysis of the incidence nor of differentiated effects across sectors.

In contrast to existing models, according to the authors of the Commission document, this new DSGE model is novel in the way it emphasizes the macroeconomic effects the tax could have and captures SOME of the endogenous channels by which the effects of the tax could emerge. Note also that this model does not only look at the cost of levying the tax in terms of GDP, but also at the effect on volatility in the economy by assuming that uninformed traders (noise traders) are active in the stock market. These traders often do not consider the economic fundamentals in their investment decision and therefore can distort market functioning, sustaining severe misalignments that cause bad allocation of resources and end in crises that cause real economic destruction.

If the FTT reduces certain financial market distortions and thus systemic risk, it can – by reducing the risk of future crises - lead to significantly higher long-term growth. There is a parallel with the argument, made in the paper by Miles (2011) from the Bank of England's Monetary Policy Committee, suggesting higher capital adequacy requirements for banks and modeling that as positive for growth, as it reduces systemic risk and therefore the probability of future crises. Crises clearly always lead to periods of substantially lower or more often, significantly negative growth. (For eight centuries of empirical evidence on the link between crises and lower growth, see Reinhart and Rogoff. For a recent assessment of the negative effects of the European crisis on UK median income, see IFS, 2011 and below.)

Specifically, the initial Commission model (European Commission, 2011) assumes that all private investment is financed by securities and that the financial sector only trades these securities, and that the STT is paid by traders to the government and then transferred to the household sector in form of a lump sum payment. In terms of channels, the STT decreases share prices which leads to higher financing costs for companies. This is the main effect in this model, which leads to impacts on investment, GDP and other macroeconomic variables. In this model the initially higher consumption of private households triggered by the lump-

sum transfers received cannot compensate for this. Consumption and growth seem insufficiently developed in this model, with no allowances for different propensities to consume or the marginal role played by equity issuance³ in total investment and growth.

The model can be calibrated either to raise a defined amount of tax revenues or it can set a defined tax rate (in which case, the tax revenues will be determined by the model). The main focus of the Commission's work is on the case of the introduction of 0.1% tax rate on securities transactions.

With a tax rate of 0.1% the model shows initially, under the stringent assumptions described above, drops in GDP (-1.76%) in the long-run. This initial Commission (European Commission, op cit) estimate came alongside a number of highly relevant caveats, that imply a far lower drop in GDP or may even lead to a positive estimate of FTT impact on GDP level (for the latter, see section 2.3).

The new version of the model developed by the authors of the original model (Lendvai and Raciborki, op cit) modifies the way investment is financed by assuming only part of it is financed via equity raised on the stock market, with the rest being financed by bank loans and retained profits - neither of which are affected by the FTT. Particularly as a result of this change the negative impact of the FTT on level of GDP falls significantly to -0.2%.

Within the environment of both versions of the model the rate of 0.1% would translate into tax revenues of at least 0.08% of GDP or about EUR 9.8 billion at a minimum, considering EU-27 2010 GDP.

As these model make a series of stylized assumptions, for instance about the functioning of financial markets, the European Commission recognizes clearly that its numerical results have to be interpreted with caution; they therefore recognize they do not present precise values, and proceed to add mitigating factors.

2.2 Estimating the effects of the mitigating elements by the Commission

The model is seen by the Commission as a first attempt to encompass some of the endogenous channels through which such effects could emerge. It is limited to a tax on securities, therefore excluding the derivatives markets.

The baseline scenario looks at a 10 basis points (i.e. 0.1%) tax on securities trading. The main channel, according to the model, is a decrease in investment.

In its proposal, the European Commission tries to come with a design of the tax that aims at closing as many loopholes as possible. In particular, the tax would be designed as to:

- (a) Mitigate relocation effects.
- (b) Exclude primary markets for stocks and bonds to try and ring-fence the effects of the tax on the financing of companies.
- (c) Target transactions that involve financial institutions and exempting from the tax those that do not involve such institutions.

³ Secondary equity markets play an important role in underpinning the primary equity markets, but they are principally markets for corporate control.

- (d) There is no doubt that many transactions may not be economically viable under a transaction tax. This, according to the Commission, is probably the case of High-Frequency Trading. Indeed, we think reducing High Frequency Trading could actually have a positive long term effect on growth, given that it could reduce systemic risk and thus the likelihood of crises.
- (e) Try to ring-fence some sources of financing for companies by excluding them from the proposal (bank lending, retained earnings). In such case, they would not be directly impacted by the tax.

The Commission clearly recognizes that these features of the tax are not necessarily well taken into account in the modeling of the macroeconomic effects. There is no available model to assess these additional effects and the channels through which they impact macroeconomic variables. The only available approach is therefore to use “proxies” to estimate the effects. For this purpose, the following elements are suggested by the Commission to be taken into account:

- (a) The relocation aspects are already factored in. This is because the model is a closed economy model.
- (b) Primary markets for stocks and bonds are a small fraction of the total amount traded. For the purpose of the impact assessment, the primary market for securities is proxied by the Commission to be about 2.2% of the total. Excluding primary markets could in the best case decrease the effects of the tax by 2.2%.
- (c) Transactions done by financial institutions have been proxied in this impact assessment to represent 85% of all transactions. Therefore, as a first approximation, only taxing transactions involving financial institutions could decrease the effects of the tax by 15%.
- (d) High-frequency trading could be up to 40% of the total in some market segments. Provided the disappearance of high-frequency trading would be at no cost, the 'real' effects could be estimated to be 40% lower. However, if the reduction or elimination of HFT would have positive externalities for systemic stability and growth, as the authors of this study believe, the positive impact on growth could be significantly larger.
- (e) Based on most recent EC and BIS data, the sources of financing of companies are assumed by the Commission to be primary equity issuance (10%), retained earnings (55%), and debt (35%). The share of debt securities in total debt of nonfinancial corporations could be estimated at about 15% (or about 5% of total financing). As we discussed above, this mitigating factor is now incorporated into the second version of the model, see again Lendvai and Raciborki, op cit. This implies the growth effects of FTT are now down to -0.2% of GDP, just due to factor (e) alone.

Under the assumption that all the other effects simply cumulate, the negative long term effect of the FTT on GDP level would, in this more realistic scenario developed by the Commission itself, decrease significantly to less than -0.1%.

This number is still likely to be an over-estimate, as it does not take into account that instead of a reduction in investment, there is merely a substitution away from frequently traded sources of investment to less-frequently traded, such as bank loans, but also private equity. The Commission’s model implicitly assumes that a switch from public equity to private equity reduces long-run economic growth, which is not validated by empirical evidence.

2.3 Our complementary analysis of additional growth impacts of FTT

Though providing a very important framework for analysis, the Commission model (in both its versions) is incomplete in examining the effects of an FTT on the level of GDP. Several aspects are difficult to include in this type of model, but in the real world would tend to have a positive effect on growth. We therefore explore them, mainly at a qualitative level, though we provide a proxy for the impact on the level of GDP of lower probability of crisis.

Indeed, possibly the most important additional positive effect on future growth is that the FTT would somewhat reduce systemic risk, and therefore the likelihood of future crises. We are clearly not arguing that on its own, the FTT would reduce the risk of crises, as prudent macroeconomic policies and effective financial regulation as well as supervision also have a major role to play in crisis prevention. However, by significantly reducing the level of noise trading in general and reducing (or eliminating) high frequency trading in particular, the FTT would make some contribution to the reduction of severe misalignments and hence the probability of violent adjustments. Moreover, in financial crises “gross” exposures matter more than the net ones, and financial transaction taxes will reduce the gap between the two. The growth costs of crises are massive. For example, Reinhart (2009) estimates that, from peak to trough, the average fall in per capita GDP, as result of major financial crises, was 9%. The Institute of Fiscal Studies (2011) has recently estimated that for the UK, when comparing the real median income household income in 2009-2010 with 2012-2013, the decline will be 7.4%. Of course for European countries directly hit by the sovereign debt crisis, like Greece, the decline of GDP and incomes will be far higher.

We recognize that less probability of crises also comes with less probability of booms, but the reduced amplitude of economic cycles will reduce risk and uncertainty, boosting productive potential. Peak to trough measures of a crisis are also an underestimate of the crisis because the GDP of countries without crises would have not stagnated, but would have grown (see Griffith-Jones and Gottschalk, for estimates of lost GDP during the Asian crisis, both due to foregone output growth and actual GDP declines)

Should the FTT, for example, decrease the probability of crises by a mere 5%, (which is a very low assumption), and the cost of GDP lower growth in the long term due to crises were around 7 % which consistent with the above estimates, then the positive impact of the FTT on the level of GDP, due to crisis avoidance, could be a 0.35% of GDP. In that case, the net effect of the FTT on the level of GDP would be +0.25 % (if we combine the negative impact estimated by the Commission model of -0.1%, with the positive one just estimated of +0.35%).

There is another long term positive potential effect on growth of an FTT, noted originally by Nobel Prize winner James Tobin. Extremely high remunerations in the financial sector contribute to attract some of the brightest graduates to financial activity, instead of to industry or commerce, or research on innovation. Should as a result of the FTT, the relative income of some of the highest paid employees in the financial sector be relatively lowered, then it could encourage some of these very bright minds to move to activities that could enhance the present and future competitiveness, and thus growth in Europe. People with similar educational qualifications become financial engineers in London and mechanical engineers in Dortmund and the long-term statistics suggest the latter is better for long-run productivity growth. We will not attempt to measure this effect of improving the allocation of human resources, but just note its qualitative positive impact.

We would like to finish this section by outlining the impact of an FTT on the level of GDP under three different uses of the FTT, uses which could be combined, according to political decisions. The first use is that the FTT would be additional to existing taxes. In this case, the FTT would contribute to fiscal consolidation, a highly desirable aim, especially for those European countries with large public debts and fiscal deficits. As pointed out above, fiscal deficit reduction in those countries would lower the cost of their new borrowing which would positively impact on their growth and in some cases could contribute to diminish the severity of their sovereign debt crisis. More broadly, both in the short but also in the long term, by reducing fiscal deficits, private investment could be crowded in, with a clear positive impact on GDP level. This effect is not included in the Commission model.

The second scenario is that the FTT is fiscally neutral, in the sense that other taxes could be reduced-or increased less than they would have been. Given that there is strong evidence (including in the European Commission study) that the FTT would be more progressive than other taxes, this could imply that a higher proportion of households income would be consumed, as relatively poorer households spend a higher proportion of their marginal income than do relatively richer households. If revenues from an FTT allowed a country to lower its income tax or VAT, aggregate demand would rise, as would growth; this effect would be especially valuable in the current context where most economists see lack of aggregate demand as an important factor in slow growth or recession.

A third scenario is that the proceeds of the FTT would be spent, either at a European level (for example by the European Commission and/or by member governments). Especially if these funds were used for increased investment, for example in green infrastructure or to help catalyze increased production and innovation in SMEs, this would have both immediate positive short term aggregate demand and positive long term aggregate supply effects on economic growth. If some of these resources were used indirectly, for example via increasing the capital of the European Investment Bank, with leveraging effects on its lending to the private sector, this would imply an even higher impact on growth. Indeed this may be a particularly reliable way of increasing investment in the short to medium term, as if the FTT was not implemented, the higher corporate earnings would not necessarily go to private investment due to poor growth expectations; even in normal times, a certain proportion of corporate earnings is distributed as dividends or bonuses, part of which may not be totally spent, thus contributing to lower aggregate demand, and imply lower short term and long term level of GDP.

Last but certainly not least, an FTT would not just contribute to growth in general, but also to fairer and more sustainable growth. More equal growth, which could be helped somewhat by a progressive tax such as the FTT, is an important objective given the increased and worrying trends towards greater income and wealth concentration. More sustainable growth could be helped by channeling some or all the proceeds of the FTT to investment, both public and private, in the low carbon economy.

3. KEY ISSUES IN IMPLEMENTING A FINANCIAL TRANSACTION TAX

3.1 Taxing by residence of investor

The way to minimize tax avoidance and evasion in a financial transaction tax is the same for all taxes and was well described by Botswana President, Festus Mogae, as turning the undesired activity from a high return, low risk venture, into a low return, high risk one. In the case of FTT, this means a light tax rate to make avoidance a low-return venture, and enforcing heavy consequences of non-compliance, to make it risky.

Most taxes, such as income and corporate taxes are levied on the basis of the residence of the tax-payer; however, an increasing amount of taxes, such as Value-Added Taxes, petrol taxes, airport and port taxes and congestion charges are levied on the basis of a specific activity, are hard to avoid while still engaged in that activity and end up being paid by many visiting non-residents. Politicians may consider taxes levied locally and paid by foreign voters as an ideal tax. Part of the reason for this trend is that over time, the residence of some individual and corporate taxpayers has become harder to pin down, especially after the removal of restrictions on cross-border money flows and advances in cross-border ICT.

This is particularly the case with regards to individuals and their investment activity. A financial transaction tax, levied on residents when they buy or sell a local share could be avoided by a resident buying a foreign security where the security is a holding of a local share. This hole served to undermine the 0.5%, Swedish financial transaction tax that was introduced in January 1984, on the purchase or sale of an equity security by a Swedish resident, collected through Swedish brokers. (Later, a smaller tax was placed on transactions of fixed-income instruments.) The tax was relatively high and there were easy, untaxed, substitutes for Swedish securities. Avoiding the tax was a high-return, low risk venture and so many Swedes routed their purchases through London or traded other Scandinavian bond markets.

It is important to point out that while this leak was large it was far from total. Not all investors can deliberately avoid taxes in this manner – such as public pension funds. However, taxes in which avoidance is technically legal, high and common, but uneven, quickly become unpopular. Swedish brokers felt particularly hard done by as their business had merely switched to foreign brokers. Despite raising over \$1bn per year, the Swedes scrapped this tax.

One way of covering this leak would be to make residents liable for the tax on the purchase or sale of any security and therefore even buying foreign securities, irrespective of whether their underlying holdings were local securities or not, would not be a way of avoiding the tax. This would reduce the incidence of avoidance significantly, however, given the ease of transferring funds abroad and setting up foreign entities that bought and sold local and foreign securities, there may still be incentives to avoid a high transaction tax.

It would be wrong to argue that financial transaction taxes levied on the residence of the investor would be completely avoided, especially in a world where the largest proportion of assets are held by pension funds that enjoy certain tax advantages by being resident pension funds. Moreover, new regulatory requirements for mandatory reporting of all trades, on or off exchanges, make evasion through non-reporting harder than before. However, the wider trends in free movement of capital and technology, suggest that the risks to avoidance are not particularly high today and we worry that taxes where there is known to be significant avoidance lose a sense of legitimacy that furthers innovation in new forms of avoidance. At the same time, the trends in financial regulation, liquidity management and risk-management suggest there are old and new ways to making the risks to avoidance and evasion substantially higher for certain transactions.

3.2 Taxing by residence of issuer

Stamp taxes are paid by anyone - residents and non-residents, corporates or individuals - on the transfer of ownership of a resident security. Where “stamp taxes” are due⁴, a non-taxed and therefore non-stamped financial transaction cannot be legally enforced, and there can be no registered change of ownership to local or foreign buyers until taxes are paid to, and stamped by the authorities. Non-enforceability of contract is a very high consequence of non-compliance with the stamp duty. It is particularly so where registered owners of assets are due to receive certain benefits and rights like voting at shareholder meetings, dividends, interest coupons, rights issues, buy-outs etc. These stamp taxes are collected at settlement where change in registered ownership takes place. (They are a levy on the transfer of legal ownership, not on transactions per se and so the compliance of brokers around the world is not necessary.)

In order for the authorities to tax a transfer of ownership, the register of owners has to be held in their jurisdiction and hence the issuer of certificates of ownership (shares) would need to be locally incorporated. It is possible for companies to jump ship and incorporate somewhere else, but the same argument could apply to changes in corporation tax and much larger differences in corporation tax between jurisdictions have proven sustainable. Moreover, this tax is not paid directly by the Company (primary issuance is often exempted) but by resident and non-resident investors in the secondary markets whose tax payment is highly variable depending on the frequency of trading.

Stamp duties are nigh impossible to avoid. A Chinese investor, using a British bank in Hong Kong, to buy a French security will still have to pay the tax because otherwise he will not receive legal title to the security and could not receive any dividends, rights and claims and his contract to buy the shares would be unenforceable in the relevant jurisdiction. This is too high a risk for investors to take – no pension fund trustee would take such a risk. Taxing by residence of issuer is therefore far more effective with very strictly limited scope for avoidance. Stamp duties on financial transactions already raise over USD\$23bn per year. And a high proportion of those paying these taxes are non-resident of the country imposing the tax – in the case of the UK it is estimated that 40% of the Stamp Duty Reserve Tax on UK equities is paid by non-UK-residents.

3.3 New regulatory requirements and central clearing

It should be noted that instruments which are not-taxed and are therefore not legally enforced, could not be considered eligible for central clearing by a clearing house. This is of crucial importance today and represents one of the ways in which financial transaction taxes are far more feasible than before, even for derivative instruments. One of the responses to the financial crisis by G20 and the Financial Stability Board is a regulatory requirement that all exchange traded instruments, including equities, bonds, derivatives and all vanilla over-the-counter transactions such as CDS, must be centrally cleared. Instruments held by financial instruments that are not centrally cleared will incur a capital adequacy requirement⁵ - that far exceeds suggested levels of transaction taxes.

⁴ Stamp taxes have a long tradition in many countries including Malaysia, Netherlands, Ireland, Israel, UK and the US.

⁵ The Communique, issued after the G20 meeting in Pittsburgh in September 2009, states: “all standardized OTC derivatives contracts should be traded on exchanges or electronic trading platforms, where appropriate, and cleared through central counterparties by end-2012 at the latest,” “OTC derivatives contracts should be reported to trade repositories,” and “Non-centrally cleared contracts should be subject to higher capital requirements.”

The consequences therefore of holding non-taxed instruments, in terms of loss of legal certainty, higher counter-party risk, loss of gains from netting in a clearing house, and the cost of higher capital adequacy requirements for holding them, are quite substantial. It is estimated that over 70% of OTC credit derivatives will be centrally cleared and those that are not are highly bespoke complex contracts that the clearers refuse to accept. These instruments are unlikely to be frequently traded. Of course even the non-centrally cleared instruments would be subject to the tax and the contract would be unenforceable if the contract were not stamped. Even if one investor were prepared to take all of the risks – for the sake of saving a small fraction of one percent - they would then have to find another, equally prepared to do so, so as to exit from their investment with a return. Non-compliance would be a high-risk venture.

3.4 Derivatives, contracts for differences etc.,

It is often argued that if there were a tax on transacting financial instruments, market participants would switch to the derivatives market where the tax could not be levied because derivatives are invariably not issued by the issuer of the underlying security. There are a number of reasons why this argument is suspect. However, it is important to remember when considering financial innovation and complex instruments that our benchmark is to minimize evasion and avoidance, not to come up with a tax that has a 0% avoidance or evasion rate for all time. There are many ways to evade and avoid plain vanilla taxes that contribute most to national treasuries: income, corporate, capital gains and sales taxes. The degree of avoidance of any tax depends in part on the size of the tax, the consequences of being “caught” and the willingness of the authorities to monitor avoidance and evasion and seek new ways of plugging any emerging loopholes. In the case of a stamp duty paid on the legal transfer of all financial claims, including derivatives and contracts for differences, we are arguing about a small tax with large consequences if they are not paid.

These consequences include the simple and traditional legal one, where contracts to buy or sell an instrument, including a contract for differences will be ruled unenforceable if a stamp tax has not been paid. This is a tough consequence. The major end-owners of financial instruments, such as pension funds, insurance companies and the largest international banks could not, for a host of regulatory, risk-management and fiduciary reasons, hold instruments where their legal enforceability was in doubt. Indeed, as we have discussed above, an untaxed instrument would be ineligible for central clearing, a new requirement of all vanilla, OTC, derivative instruments, as well as equity and fixed-income instruments, which would cost the evader several times more than the tax. There could be further regulatory rules where instruments that were untaxed could not count as collateral or capital in the countries in which the tax was imposed.

The challenge of derivatives is that because they can be issued by anyone, they need not be issued in the same jurisdiction as the issuer of the underlying taxed security. There are two ways of addressing this; the first is to tax foreign securities by the residence of the investor as well as having a stamp duty on locally issued transactions. We return to this later. The second is to be satisfied that derivatives are not a sustainable avenue of tax avoidance because they are not disconnected from the underlying instruments and are often hedged by (taxed) transactions in the underlying cash equity markets.

It is easy to be mesmerized by the notional size of derivative markets. The credit derivative swaps market for instance is estimated to be \$30trn, or almost double the size of the US equity market. But these measures of size can be illusionary, often represent double counting of gross notional positions while the value of net positions are often considerably smaller. Moreover, derivative transactions are compliments to the positions in the underlying markets, not substitutes. Indeed, equity stamp duties continue to raise large sums where they are

surrounded by highly liquid and large equity derivative markets as in the case of the UK, Hong Kong, Taiwan, India, South Africa and South Korea.

In many cases a derivative position is a hedge against movements in an underlying holding for which the tax would have been paid. In cases where the derivative is the main focus, investors trade in and out of the underlying market - and hence would pay the tax - in order to hedge their derivative exposures. Imagine, a bank has sold a call option on GE shares to an investor so that were GE shares to rise above a certain strike price, the bank would be obligated to deliver \$100m of GE shares to its customer at that strike price. Imagine that after a rise in the price of the underlying share, the probability that the bank would have to do so and would be “short” \$100m of rising GE shares had risen from 5% to 50%. In order to limit the bank’s potential loss from this derivative contract, the bank would buy some GE shares now, at lower prices, and in doing so, would pay the tax. The tax would have to be very substantial, certainly above 1.0%, for the bank to decide it would rather expose itself to a multi-million dollar loss, and collateral call and increased capital adequacy requirement than pay the transaction tax.

The long and short of it is that derivatives are less of an obstacle to a financial transaction tax than many people think. Derivatives are often compliments to the underlying markets rather than substitutes and taxes on the underlying instruments can co-exist with healthy derivative markets as we already observe. Where derivatives are a hedge for an underlying instrument, or are themselves hedged by transactions in the underlying transactions a transactions tax would be collected. But this is not always the case. To avoid substitution from the underlying markets to the derivative markets, derivative transactions can be taxed on a residence basis.

3.5 Implementation mechanisms

We would therefore recommend that the financial transaction tax be levied in two ways. First, as a tax on the transfer of legal ownership and that no transfer of legal title is legally enforceable without a stamp indicating that the duty has been paid. No special mechanisms are needed to implement this. The revenue authorities can establish automatic electronic stamping of certificates where there are automatic electronic payment schemes and these are likely to be established by payment settlement agents. This is already in place in many countries. The UK SDRT is mechanically paid to the UK tax authorities by the investor, through settlement agencies connected to the clearinghouses – which for a long-time were physically in Belgium.

There would then be a further FTT on foreign securities paid by residents in their annual tax declaration of investment activity. In countries that have capital gains tax on security sales the information required to calculate the transaction tax is already declared. Additionally, there is often a withholding tax on dividends to foreign residents and so there often is a substantial incentive – far greater than the tax – to declare the transaction in order to receive a tax rebate from the foreign tax authorities.

The combination of a Stamp Duty that is hard to avoid, and a wider FTT that may be easier to evade through non-reporting, but only at the expense of withholding tax rebates, and complex, costly, illegal and financially inefficient ring fencing of local and resident portfolios, may be better than either a Stamp Duty alone or a wider FTT alone.

3.6 Optimal size, elasticities and distortions

The optimal size of tax from a revenue perspective is one that does not contract post-tax demand for the taxed activity to such an extent that revenue falls with higher tax rates. To judge the optimal tax rate we need to estimate the elasticity of demand to changes in prices – the amount that demand for an instrument will fall following a rise in price (caused by anything, including higher transaction costs). A number of studies have tried to estimate the price elasticities for one country imposing a transaction tax⁶. These studies indicate that the elasticities of demand for equities, for example, are in the region of 0.25 to 1.65, averaging around 1.0 so that a 1% rise in transaction costs (including taxes) will lead to a 1% fall in volume. These elasticities suggest that transaction taxes would have to rise over 1 percentage point in mature markets and even more in emerging markets before the tax take was undermined by a reduction in turnover.

Moreover, these point estimates of elasticities are likely to be an over-estimate of the effect of modest rises in transaction costs. Below a certain size of transaction costs, the level of general uncertainties, including the likelihood of the asset price changing during the transaction period, means that there comes a point where the gains from a further reduction in administrative transaction costs are swamped by trading transaction costs (such as the price-impact of trading, trading commissions etc.) and their reduction therefore yield no impact. Similarly, because of these uncertainties, the investment literature generally shows that where nothing else changes, small changes in the short-term cost of capital, like the ones we are discussing here, have little impact on investment demand⁷. The empirical evidence suggests that a 0.1% tax would therefore have a minimal impact on demand and would therefore, despite its low level, yield significant sums.

To reduce substitution, not penalize one financial instrument over another and to maximize tax collection while minimizing tax rates, the tax should be collected across all financial instruments. The non-enforceability rule would bite just as hard for a contract for difference as it would for an equity purchase. Across different instruments the tax should be sized to reflect, in general terms, the underlying elasticity or short-term volatility of that instrument so as to reduce potential economic distortions. The tax should be highest where the elasticity is low and demand will be relatively unaffected and lowest where the elasticity is highest and demand would be more affected⁸.

Analysis of different elasticities⁹ suggests that a reasonable range, erring on the side of caution, of the ratio of the tax in equities, bonds and short-dated bonds should be five to one for equities to long-dated bonds, and 2 to 1 from long-dated bonds to short-dated bonds. Hence, if there were a 0.50% tax on equities, the tax on long dated bonds would be 0.1% and the tax on short-dated bills, swaps and futures would be 0.05%. This analysis on the optimal size of the tax resonates with those transaction taxes that currently exist and appear most successful.

It should be noted that a majority of foreign exchange transactions involve an underlying equity, bond or other instrument that would be stamped, with bonds and bills playing a particularly important role for those seeking the currency market “carry trade” and consequently, extending the tax to bonds would effectively extend it to the currency markets.

⁶ For a recent review of the results of these studies, see McCulloch and Pacillo (2010)

⁷ For an interesting study on the elasticities of investment in general to transaction taxes where the potential for substitution is high, see “Taxes, the Cost of Capital, and Investment: A Comparison of Canada and the United States.” Kenneth J. McKenzie and Aileen J. Thompson, April 1997

⁸ This principle, which maximizes the tax take, or producers’ surplus, is also known as “Ramsey Pricing” after Ramsey (1927) and Edgeworth (1910).

⁹ See, Pollin, Baker and Schaberg, (2003).

The effect on demand of an instrument will also depend on a couple other things the studies on elasticities tend to neglect. First, the elasticity would be smaller the more countries participate reducing the substitution effect captured in the studies. Second, the elasticity would be smaller or larger, depending on who the investor is. The elasticity of demand for a volatile instrument, by a long-term investor, who is hedging this volatility across time, would be far smaller than the elasticity of demand from high-frequency traders for instruments with generally lower intra-day volatility.

Table 1, below is an estimate of the effect on revenues and turnover, using the elasticity measures cited above of the proposal for a 0.1% tax on equity and bond transactions alike. The table shows that at this tax rate, reductions in equity volumes would be modest and the taxes raised still significant and the effect on turnover will be greater in the bond markets, but because of their size, the tax take would still be highly significant.

THE FTT CALCULATOR

Countries	Current Turnover, \$ millions		Assumed max. loss of turnover (3) (4) FTT Revenues					
	Equities (1) Bonds (2)		Equities		Bonds		Equities & Bonds	
Argentina	2,567	52,920	8%	33%	2	36		38
Australia	1,013,594	811,188	8%	33%	933	547		1,480
Brazil	859,258	763,560	8%	33%	791	515		1,306
Canada	1,395,994	1,143,072	8%	33%	1,285	771		2,056
China	8,068,722	1,781,892	8%	33%	7,425	1,203		8,627
France/Netherlands/Belg	2,010,284	3,847,284	16%	42%	1,691	2,230		3,921
Germany	1,467,487	2,032,884	16%	42%	1,234	1,179		2,413
Hong Kong	1,488,664	75,600	13%	42%	1,302	44		1,346
India	1,059,712	369,684	8%	33%	978	249		1,227
Italy	972,649	1,663,200	16%	42%	818	964		1,782
Japan	3,980,240	8,070,300	16%	42%	3,348	4,679		8,026
South Africa	251,365	91,476	6%	33%	236	62		298
South Korea	1,596,275	690,228	5%	33%	1,520	466		1,986
Spain	1,351,791	1,108,296	16%	42%	1,137	643		1,779
Switzerland	785,234	505,008	11%	42%	696	293		989
Taiwan	894,685	9,072	6%	33%	844	6		850
UK	2,505,677	3,031,560	7%	42%	2,335	1,758		4,092
US	27,540,235	23,566,032	16%	42%	23,163	13,662		36,825
G20	52,724,059	47,915,280	10%	37%	45,757	28,321		74,078
less countries with FTT	40,517,508	42,747,264	9%	26%	34,303	24,968		59,271
Euro-6	5,802,211	8,651,664	16%	42%	4,062	5,016		9,896
Emerging	12,732,584	3,758,832	7%	33%	11,796	2,537		14,332

(1) Annual turnover in domestic companies in 2010. Source: World Federation of Exchanges

(2) Estimates of annual turnover of domestic bonds. Estimates are derived from a combination of sources and estimates including MTS, ECB.

(3) In calculating tax revenues we conservatively assume that rising taxes reduces volumes, in turn reducing revenues. These estimates are derived from the elasticity of demand assumptions

(4) In calculating these numbers we have added existing equity FTTs to transactions costs in the case of Hong Kong (0.1%), India (0.025%), South Africa (0.25%), South Korea (0.3%), Taiwan (0.3%) and the UK (0.5%)

CHANGE ASSUMPTIONS HERE (IN BOLD)

Assumptions	Equities	Bonds
FTT Rate	0.10%	0.10%
Elasticity	-0.60	-0.60
Current transaction costs in most liquid markets		
Institutional	0.20%	0.04%
Retail	0.50%	0.18%
Average	0.30%	0.07%
Current transaction costs in less liquid markets		
Institutional	0.45%	0.09%
Retail	1.13%	0.18%
Average	0.67%	0.11%

3.7 Who pays? Pensioners?

Commentators sometimes argue that customers will ultimately pay the tax, which is correct, but not all consumers of financial products will pay equally: long-term investors like pension funds and insurance companies will pay least and short-term speculators like hedge funds or High Frequency Traders (HFT) will pay most.

According to Lipper the average pension fund holds a stock on average for 2 years. If we assume then that there is a 0.1% transaction tax for buying and selling and every two years a pension fund has bought and sold 50% of its portfolio, it would pay transaction taxes

equivalent to 0.05%¹⁰.

A High Frequency Trader will turn over its entire portfolio in a day, would pay transaction taxes of 50% per year, or 100 times more than an average pension fund¹¹. What is likely to happen therefore is that high-frequency trading falls off dramatically.

The cost of financial crashes is as heavy for investors as it is for the economy. Stock value declines in crashes are in the region of 33% to 50% and crashes occur on average within every 10 years. We point out above that financial crashes have many proximate causes, however, crudely, if a transaction tax of 0.1% reduced the role of “noise traders” which reduced the size of misalignments in markets, which reduced the incidence of financial crashes by just 5%, then the increased expected return of pension funds would be higher than the 0.05% cost of the tax¹². The actual equation would have to take into account whether the reduction in the risk of a financial crash increased the long-term return of assets or just altered the return profile over time. It is likely that reduced volatility and therefore uncertainty reduces the need for precautionary behavior and increases the sustainable rate of return, but the essential point is that the cost of the tax will fall least on pension funds, would be marginal compared with returns and if the tax brought benefits in terms of financial stability these benefits are likely to offset these slight costs, boosting pensions.

Creating disincentives for short-term speculation (as opposed to long-term investment) is considered an attractive feature by many and was one of the arguments used originally by John Maynard Keynes and James Tobin in favour of transaction taxes¹³. Others suggest this might undermine liquidity, but this argument specious. While high turnover is one symptom of liquidity, financial market liquidity is about diversity: when you want to sell, someone wants to buy because they have a different valuation or investment goal or strategy.

During calm times, when markets are already liquid, high-frequency traders are contrarian and therefore support liquidity, but this is when liquidity is already plentiful. During times of crisis, they try to run ahead of the trend, draining liquidity just when it is needed most, as we saw with the Flash Crash on 6 May 2010. If a transaction tax limits high frequency trading it will provide a bonus in improving systemic resilience, bringing GDP and investment benefits¹⁴.

4. REVEALED PREFERENCES: EXISTING FINANCIAL TRANSACTION TAXES

The studies on elasticities referred to above contained significant margins of error and so it is useful to cross-reference them with what we can observe. Today, around \$23bn are raised annually by just seven countries through financial transaction taxes. Almost half of this revenue is raised by the UK and South Korea where both have a 0.5% stamp duty on equities only and active derivative and fixed-income markets.

¹⁰ The rough calculation is $(0.001 \text{ (tax)} \times 2 \text{ (buy + sell)} \times 0.5 \text{ (half the portfolio)} \times 0.5 \text{ (in one year and not two x 100)} \text{ per year}$.

¹¹ The rough calculation is $(0.1 \text{ (tax)} \times 2 \text{ (buy + sell)} \times 1.0 \text{ (the entire portfolio)} \times 250 \text{ (every day)} \text{ per year} \times 100)$.

The rough calculation is $(0.33 \text{ (loss given a crash)} \times 0.05 \text{ (reduced likelihood of a crash)} \times 0.1 \text{ (every ten years)} > 0.001 \times 2 \times 0.5 \times 0.5)$

¹³ One of the observations of Adair Turner, Chairman of the FSA, shared by others, is that the collapse of transaction costs towards zero facilitated the creation of huge derivative markets balancing on relatively small underlying markets, which made financial systems more vulnerable in a crisis. The optimal level of transaction taxes may be low, but it is not zero.

¹⁴ This destabilizing behaviour is well described in “Positive feedback investment strategies and destabilizing rational speculation”, J. Bradford de Long, A. Shleifer, L. H. Summers and R. Waldman, *Journal of Finance*, June 1990.

TABLE 2: Selection of existing Securities Transaction Taxes

SELECTION OF EXISTING STTs						
Country	STT Revenue (\$bn)	STT rates for different assets				
		Equity	Bonds/Loans	Options	Futures	Capital Levy
Hong Kong	2.79	10 basis points				
India	1.22	0.25% on stock rise; 0.025% on intraday transactions; local stamp taxes may also apply	Local stamp duties may apply	0.017% on premium; 0.125% on strike	0.017% of delivery price	
South Korea	6.08	0.5% on value of shares in corporations or partnerships				0.1-0.4% tax on capital formation
South Africa	1.41	0.25% of value; new share issues excluded.				
Switzerland	2	15 bps on domestic shares; 30 bps on foreign shares	6-12 bps on bond issuance			1% on share issuance in excess of CHF 1 mn.
Taiwan	3.3	30 basis points	10 basis points on corporate bond principal	10-60 basis points on premiums	Up to 0.025 basis points on interest rate futures; up to 6 basis points on	
UK	5.86	Stamp duty 0.5% on secondary sales of shares and trusts holding share		50 bps on strike price, if executed.	50 bps on delivery price, if delivered	
Total	22.66					
Notes						
Sources: IMF Working Paper 'Taxing Financial Transactions: Issues and Evidence' March 2011 and World Bank GDP Data, for all except Taiwan (source: Darvas and von Weisacker (2010), 'Financial Transaction Tax: Small is Beautiful', who quote figures from the Ministry of Finance).						
Data is for 2009 for Hong Kong and Taiwan, for 2008 for India, South Africa and the UK, and for 2007 for all other countries (South Korea and Switzerland)						

The table above ignores transaction taxes that are used to pay for specific, market related, regulatory functions. Arguably, except for how the funds are used, these “fees” have exactly the same economic and financial effects as transaction taxes and so the true collection of securities transaction taxes and fees around the world annually is likely to be far higher than \$23bn.

The US SEC, the securities regulator, is self-funded by a transaction tax on the volume traded on exchanges. Many who rile against transaction taxes and argue that slight taxes will exact huge disrepair to markets are often unfamiliar that, without the sky falling upon us, the US SEC charges a 0.00257% tax on transactions that today raises a not-trifling \$1bn, annually, to fund the SEC. This tax is called “Section 31 fees” after section 31 of the Securities Exchange Act of 1934¹⁵. These fees were raised in 2010 from 0.0017% - without the sky falling in - and are likely to rise given the additional expenditure at the SEC. Clearing houses also transaction

¹⁵ Under Section 31 of the Securities Exchange Act of 1934, self-regulatory organizations (SROs) -- such as the Financial Industry Regulatory Authority (FINRA) and all of the national securities exchanges (including the New York Stock Exchange and the American Stock Exchange) - must pay transaction fees to the SEC based on the volume of securities that are sold on their markets. These fees recover the costs incurred by the government, including the SEC, for supervising and regulating the securities markets and securities professionals.

fees of similar order¹⁶ and will likely raise their fees in response to new regulatory burdens, without anyone worrying that the sky will fall in.

The table above does not show the picture through time. Stamp taxes are old and common taxes¹⁷. Before the financial crisis when the sector convinced us that nothing should stand in the way of more trading, some of these taxes were taken off or moderated as their yield grew so large as was the case of the US securities tax, but more recently, some have been put on. One of the essential lesson from the history however, is that this is a policy that can be tried and, if it proves too costly, reversed relatively easily and quickly. The US Section 31 fees have been lowered 9 times and raised 7 times since 1934 without stir.

The “revealed preference” from those countries that are raising significant sums is that tax rates are at worse consistent with the analysis above and arguably more “positive” from a revenue standpoint: (1) tax rates of 0.5% do not appear so high as to cause severe distortions or substantial avoidance and evasion, though as we indicated at the opening, we expect to see some avoidance; (2) we are clearly not at the wrong end of the Laffer curve: at these rates, the higher the rate the greater the revenue; (3) tax rates levied on equity transactions are higher than on bonds by a multiple of 3 or 5 to 1. It is interesting to note that the ratio of equity to fixed-income or foreign exchange fees in clearing houses also range from 5: 1 to 2: 1.

In the past taxing bonds was a little more fraught than taxing equities, principally because bonds were traded over-the-counter, more bonds were bearer instruments and short-dated bonds were cash like. However, as cited above, the universal trend towards trade-reporting, greater registered ownership under anti-terrorism finance and anti-money laundering rules and now central clearing and settlement, makes the taxing of bonds more similar to equities, while recognizing, that lower volatilities, lower elasticities and lower trading spreads argue for a higher rate on equities than bonds.

5. CONCLUSIONS

In the first part we examined the effects of an FTT on the level of GDP. We summarized in some detail the estimates prepared by the European Commission in its initial report; once the Commission introduced all the mitigating elements to its model, it came up with an estimate of a total long run loss of GDP of -0.53% as a result of the FTT. It is noteworthy that there has been a recent updating of the model used by the European Commission prepared by the same authors who did the original modeling; this updated model attempts to reflect more realistically the funding of investment by European companies, with a relatively low of level of funding via the stock market, and a higher share via bank loans and retained profits. This revised more realistic model gives a far lower estimate for impact of FTT on the level of GDP, equal to only -0.2%.

However, the Commission estimates are based on a model that even in its revised form is somewhat incomplete, and excludes some of the crucial positive impacts; some of these positive effects through which an FTT could increase the level of GDP, emphasizing in particular the reduced risk of future crises. Therefore, we examine this positive impact, and conclude that it is likely to more than compensate the negative effects, so **the impact of introducing an FTT on the level of GDP could be positive, at around +0.25%** as a minimum. Indeed, our analysis suggests that the overall positive impact on GDP level could

¹⁶ http://www.cmegroup.com/company/files/CME_Fee_Schedule.pdf

¹⁷ The first stamp tax was first devised in the Netherlands in 1624 after a public competition to find a new form of tax.

be higher, as we identify a number of channels through which the FTT could encourage higher level of GDP.

Bankers and politicians used to preen their social consciences by saying that a financial transaction tax was a wonderful idea in theory, but that it just wasn't feasible. Financial markets, it was argued, had moved from iron controls over physical trading floors with ticker tapes and order sheets to cyber space, where, with a couple of clicks trades can be routed to the financial centre with the lowest transaction costs, taxes, and regulation. Standing against this logic – and, perversely, against the UK government's continuous riposte that it would only support a tax if it was global to limit avoidance – is the fact that one of the oldest and largest financial transaction taxes successfully functions on its own without global imitation. And it does this in one of the largest and most international financial centers of the world – the UK. Since 1986, and before in other guises, the UK government has unilaterally, without waiting on others, levied a Stamp Duty Reserve Tax of 0.50% on transactions in UK equities. Despite not updating this tax to take into account derivatives and other innovations, or reducing it to improve competitiveness, it still raises \$5 billion per year.

The reason why this tax works and others, like the 0.5% transactions tax introduced in Sweden in 1984, did not is that it is a stamp duty on the transfer of ownership and not based on tax residence. If the transfer of a security has not been 'stamped' and taxes paid, the transfer is not legally enforceable. Forty percent of the UK Stamp Duty Reserve Tax receipts are paid by foreign residents. Far from sending taxpayers abroad, this tax gets foreigners to pay. The UK is not the only bustling financial centre with a stamp tax on financial transactions. Some of the most rapidly growing financial centers in the world such as Hong Kong, Seoul, Mumbai, Johannesburg, and Taipei, have long had financial transaction taxes and today these countries raise over \$23 billion per year on these 'unilateral' taxes. Even more revenues will be raised by new taxes in Brazil, which, despite these taxes, is struggling to calm investor enthusiasm. A one-off, 0.1% tax doesn't figure highly in the decision-making of long-term investors.

All taxes are an incentive for avoidance. In addition to legal enforceability, financial transaction taxes need to be modest relative to the size of existing transaction costs and spread across as many substitutability instruments as possible. There are advantages to simplicity, but on this basis the European Commission may wish to re-examine their proposal of the same rate on bonds and equities as transaction costs are quite different for these different instruments. Clearinghouses for financial transactions between financial firms have long made these distinctions in their fee structures without triggering distorting substitutions or causing confusion.

Having lost the feasibility argument, bankers have started to raise the costs to the consumer and liquidity arguments. The brunt of the tax will not be paid by ordinary pensioners and savers but hedge fund managers and investors. High-frequency traders argue that they should not be so easily dismissed as they provide critical liquidity to markets, but this is deceptive. During calm times, when markets are already liquid, high-frequency traders are contrarian and support liquidity, but during times of crisis, they try to run ahead of the trend, draining liquidity just when it is needed most, as we saw with the Flash Crash on 6 May 2010. If a transaction tax limits high frequency trading it will provide a substantial bonus in improving systemic resilience.