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**Settlement Systems and Financial
Transactions Taxes**

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September 2011

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Abstract

Recent technological advances in payment and settlement systems as well as initiatives taken in the wake of the financial crisis to regulate derivatives markets facilitate the implementation of financial transactions taxes (FTTs). Institutions operating settlement and payment systems as well as exchanges could be required to collect and remit the respective revenues to fiscal authorities. This approach involves much lower costs compared to the administrative burden associated with collecting the tax from market participants. It further reduces opportunities for tax avoidance and evasion.

The study assesses the technical feasibility of such a central approach of FIT administration. The analysis is conducted for transactions on organised exchanges and over-the-counter transactions. Regarding the latter, special attention is devoted to foreign exchange transactions that are mostly traded over the counter. Implementing an FIT on exchange-traded instruments seems to be straightforward and is now common practice in some EU countries. The Continuous Linked Settlement Bank and the establishment of Central Counterparty Platforms for derivatives traded over the counter facilitate a centralised collection of taxes also on transactions outside organised exchanges.

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Settlement Systems and Financial Transactions Taxes

Helene Schuberth¹, Stephan Schulmeister

Inhaltsverzeichnis	Seiten
1. Motivation, scope and structure of the study	1
2. Financial markets: Instruments and infrastructure	3
3. Development of financial transactions	5
4. Clearing, settlement, payment and information systems	8
4.1 <i>Clearing and settlement Systems: Definitions and recent trends</i>	10
4.2 <i>Governance and regulation of payment and settlement systems</i>	12
4.3 <i>Large value payment infrastructure</i>	13
4.4 <i>Multicurrency payment infrastructure</i>	14
4.5 <i>Central counterparties/securities settlement systems</i>	15
4.6 <i>Service providers</i>	17
5. The debate on features of optimal institutional models of clearing and settlement systems – the case of the European Union	17
6. Settlement systems and the implementation of a general FTT	20
6.1 <i>Under present conditions</i>	20
6.1.1 <i>Transactions on exchanges</i>	20
6.1.2 <i>Over the counter transactions</i>	21
6.1.3 <i>Foreign exchange transactions</i>	23
6.2 <i>FTT implementation under the conditions of the forthcoming financial architecture</i>	25
6.2.1 <i>Post-trading infrastructure</i>	25
6.2.2 <i>Securities settlement infrastructure</i>	29
7. Conclusions	30

¹ Oesterreichische Nationalbank. The views expressed are those of the author and do not necessarily reflect those of the employer.

Settlement Systems and Financial Transactions Taxes

1. Motivation, scope and structure of the study

Several countries, including some major financial centers, levy taxes on selected financial transactions, with tax revenues on average being low – except in the United Kingdom, Hong Kong (Claessens 2010) and Ireland. Tax rates, tax bases and tax eligibility exhibit significant differences across the respective countries. The most common form of a financial transaction tax (FTT) is a securities tax on secondary trading in equity shares and bonds; a few countries also tax derivatives.¹ Given the lack of a general, internationally harmonized and comprehensive tax that minimizes asset substitution and cross-border migration, the various FTTs implemented at the national level exhibit a high degree of heterogeneity. They were designed in such a way as to allow for exemptions for different financial instruments and counterparties in order to minimize tax avoidance and to prevent putting domestic financial markets at a competitive disadvantage. Thus, the current design of FTT regimes often adds to the complexity and cost-intensiveness of tax administration.

Proposals for a common and comprehensive design of an FTT have been made, including a harmonized definition of the applicable tax base, the taxable event, the counterparties to be taxed, a range of tax rates and the geographical scope of tax imposition, both for a currency transaction tax (CTT) as well as for a general FTT.² Some of the proposals could generate a rather substantial amount of tax revenues.

¹ Transactions in corporate and noncorporate shares are taxed e.g., in China, India, Indonesia, South Africa, South Korea, Hong Kong, Switzerland, Singapore, Taiwan and in some EU Member States (see Annex B). A few countries also levy a tax on equity derivatives: Equity futures and options (tax base: premiums and strike prices) as well as the underlying shares are taxed in India. In the UK, moreover, a stamp duty is levied on the strike price of equity options but not on premiums; the stamp tax also applies to the delivery price of UK equities purchased via futures contracts. In the USA, the Securities and Exchange Commission (SEC) charges a small tax on stock market transactions. For further details, see Matheson (2010).

² Among the more recent tax design proposals are Schulmeister et al. (2008) and the Leading Group (2010). The latter examines a global CTT that would apply to traditional foreign exchange transactions – spot transactions, outright forwards and foreign exchange swaps – on all major currency markets at the point of global settlement. For this type of tax, the annual tax revenue estimates range from USD 25 billion to USD 33.5 billion. Schulmeister et al. (2008) present a few scenarios on the revenue potential of an FTT. For example, at a tax rate of 1 basis point raised from trading in global spot and derivative transactions, the annual tax revenue would amount to about USD 200 billion if exchange-traded as well as over the counter (OTC) transactions are taxed. The FTT revenue estimates are based on the assumption of a decline in the trading volume of spot transactions of exchange-traded stocks (5%) and bonds (3%); the trading volume of exchange-traded derivatives is supposed to decline by between 30% and 40% (measured by the notional value), while that of OTC transactions is expected to decline by 40%. Brandolo (2011) discusses implementation issues regarding an FTT on exchange-traded, OTC- and foreign exchange instruments.

Another tax design issue refers to one important aspect of tax administration, namely the way of how and where the tax is charged and remitted to the tax agency. An FTT may be administered at the decentralized level where the tax is collected from broker dealers, banks and private investors (Schulmeister 2011), or at the central level by making use of clearing houses or exchanges to administer the FTT. In principle, the latter procedure exhibits several advantages. It involves much lower costs compared to the administrative burden associated with collecting the tax from market participants (registration for taxation, collection and compliance costs for tax agencies). Further, centralizing tax collection reduces tax avoidance and evasion. From the experience with existing transaction taxes it follows that implementation has to anticipate the wide range of avoidance opportunities, such as asset substitution and cross-border migration.

At the time FTTs or CTTs were proposed by Keynes and Tobin, the technical feasibility of their implementation was quite limited as it would have triggered migration. It is often argued that today, the increasing global interconnectedness of financial markets, the complexity and opaqueness of new financial instruments that are mostly traded over the counter (OTC) as well as the financial sector's innovative capacity to circumvent FTTs are factors that have probably made the implementation of FTTs even more difficult. But recent technological advances in payment and settlement systems as well as initiatives taken in the wake of the financial crisis to regulate derivatives markets may on the contrary facilitate administering FTTs by legally putting institutions operating settlement and payment systems as well as exchanges in charge of collecting and remitting the respective FTT to the tax collection authorities.

This paper assesses the technical feasibility of such a central approach of FTT administration. Section 2 and 3 give a short overview of the most important categories of financial instruments traded at exchanges and OTC, of trading and post-trading infrastructures as well as of recent developments in financial transactions by type of instrument and market organization (exchange- or OTC-traded). Section 4 describes the recent trends and main features of clearing, settlement, payment and information systems. Section 5 discusses the "optimality" of institutional models of clearing and settlement systems with a special emphasis on the reform of post-trading infrastructure in the European Union. Section 6 analyzes the technical feasibility of implementing a general FTT under the present arrangements for market organization and within the current regulatory environment and explores which limitations of the infrastructure currently in place make the central collection of a general FTT, and to some extent, even a CTT more difficult. Our analysis distinguishes between financial transactions that are carried out on exchanges, OTC transactions and foreign exchange transactions. Moreover, the role of clearing and settlement under the new financial architecture that is currently in the process of being either legislated or implemented will be explored in more detail and contrasted with the requirements of fully centralized FTT implementation. Finally, Section 6 also outlines some very general prerequisites that have to be fulfilled to make centralized FTT collection workable. Section 7 concludes.

2. Financial markets: Instruments and infrastructure

Financial transactions can be classified according to different criteria, in particular according to the type of assets/instruments traded in the respective market (capital market, foreign exchange market, etc.), the time of delivery of the respective instrument (spot/cash markets versus derivative markets), and to the degree of market organization (exchanges versus OTC markets).

The most important types of markets are the money, credit, capital, foreign exchange and commodity markets. For each type, there is a spot market where the "original" instrument is traded (for delivery without delay), and a derivative market where all instruments derived from the "original" asset are traded (for future delivery – primarily futures and options). The most important standardized assets such as stocks or bonds or commodity derivatives are mainly traded on exchanges, i.e., on highly organized market places. These instruments can also be traded bilaterally on the (decentralized) OTC markets. However, the great bulk of OTC transactions is related to tailor-made instruments like swaps or forward contracts.

Table 1 shows the different financial instruments as combinations of the features according to the three dimensions. As regards capital markets, e.g., "true" stocks and bonds are traded on organized exchanges or – to a lesser extent – over the counter (spot transactions). Standardized derivative instruments like stock (index) futures and options are traded almost exclusively on special exchanges like Eurex (Frankfurt), Euronext (London) or CME (Chicago). Non-standard instruments, in particular interest rate swaps, are traded over the counter. The same distinction applies to transactions in the money, credit, foreign exchange and commodity markets (spot transactions in commodity markets are not considered to be financial transactions).

The main features of the organization of trading, clearing and settlement in the different types of financial markets, and, hence, their characteristic infrastructures, are as follows:

Large value financial transactions are conducted in three steps: First, financial market participants agree to *trade* and concur on the instruments, prices and volumes. Market participants are either banks and brokers (operating mainly as intermediaries) or costumers such as corporations and non-bank financial institutions (not trading directly with each other).

After a trade is matched, it needs to be cleared and settled so that the seller gets paid and the buyer receives ownership of the security traded. Thus, following the execution of trade, a number of post-trading processes are set in motion: Payment, clearing and settlement systems channel the flow of payments for goods, services and financial assets. In its widest sense *clearing* involves the management of post-trading, pre-settlement credit exposures, to ensure that trades are settled in accordance with market rules.

Table 1: Financial markets and assets/instruments

Types of market	Main instruments	Main sources of transactions data
Money market		
Spot market		
OTC	Money market instruments (e.g., short-term bank deposits)	-
Derivatives market		
Exchanges	Futures and options on short-term bank deposits (up to 3 month)	WFE, BIS ¹⁾
OTC	Forward rate agreements Interest rate swaps Interest rate options	BIS
Credit market		
Spot market		
	Bank credit (not conceived as "financial transaction")	-
Derivatives market		
OTC	Credit default swaps	BIS
Capital market		
Spot market		
Exchanges	Stocks and bonds	WFE
OTC	Stocks and bonds	-
Derivatives market		
Exchanges	Stock (index) futures and options Long-term interest rate futures and options	WFE, BIS ¹⁾
OTC	Forward rate agreements Interest rate swaps and options with maturities longer than 3 months Interest rate options	BIS
Foreign exchange market		
Spot market		
OTC	Outright exchange of foreign currencies	BIS
Derivatives market		
Exchanges	Foreign exchange futures and options	WFE, BIS ¹⁾
Commodities market		
Spot market		
	-	-
Derivatives market		
Exchanges	Commodities futures and options	WFE, BIS ¹⁾

¹⁾ Aggregate data for the following regions: Europe, North America, Asia and Pacific, other.

Settlement refers to the completion of a transaction or of processing in a transfer system, such that participants meet their obligations through the transfer of securities and/or funds. Hence, settlement is the exchange of cash or assets in return for other assets or cash and transference of ownership of those assets and cash.

In general, instruments traded on exchanges can be easily taxed either at the point of the trade or during the settlement process. Exchanges often operate clearing and settlement systems, e.g., in the United States, Italy, Spain, and Germany. Where clearing and settlement organizations are not owned by exchanges, they are generally owned in some form by their

users (Cox et al. 2005). The trading of OTC transactions, however, is dispersed globally. Still, their clearing and settlement are to some extent centralized, varying from country to country as well as from market to market. Due to the heterogeneous nature of derivatives, bilateral arrangements coexist with centralized clearing and settlement. But centralized clearing arrangements utilizing Central Counterparty Platforms (CCPs) have become more widespread in recent years.

In principle, payment, clearing and settlement systems involve large-value payment systems, securities settlement systems and retail payment systems. The first two infrastructures, in particular, are relevant for a centralized collection of transaction taxes. These infrastructures have changed significantly over the last two decades, the most striking trends being the emergence of cross-border and offshore systems, the rise of CLS Bank, and most recently, the establishment of some CCPs for OTC derivatives (see Section 4).

3. Development of financial transactions

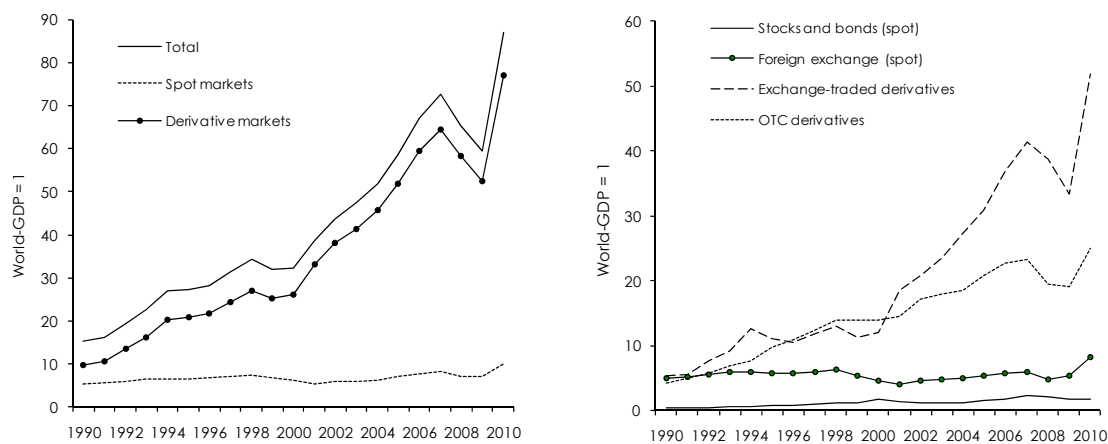
In this section we document the development of global financial markets in terms of the (notional) value of both transactions and outstanding (derivatives) contracts. The main data source is the Bank of International Settlements (BIS). It collects data on the trade of derivatives on organized exchanges on a quarterly basis (transactions and outstanding contracts) as well as on the notional value of outstanding derivatives contracts in OTC markets (on a semi-annual basis). The volumes of OTC transactions (foreign exchange spot as well as foreign exchange and interest rate derivatives) are estimated on the basis of the "Triennial Central Bank Survey" organized by the BIS.³

Data on spot transactions of stocks and bonds on exchanges are taken from the data base of the "World Federation of Exchanges" (WFE) as well as data on commodity derivatives trading on exchanges. The 2010 estimates of these transactions are based on the change in trading activities on the most important exchanges between January and October.

In 2010, the overall volume of financial transactions in the global economy was roughly 87 times higher than nominal world GDP (Figure 1). In 1990, this ratio was "only" 15. In other words, over the past 20 years, financial transactions have been growing almost 6 times faster than GDP. This difference has increased considerably since 2000.

³ This survey collects data on a triennial basis for each trading day in April (since April 1989). The average daily volume of OTC transactions is estimated on the basis of the answers of the reporting banks. Annual transaction volumes for "survey years" are estimated by multiplying the daily averages during April by 250 (the benchmark of the number of trading days per year). Data for the years between survey years are obtained through linear interpolation. Our data base includes the results of the April 2010 survey (BIS, 2010). In order to take into account the impact of the financial crisis on OTC transactions, changes in OTC transactions between 2007 and 2010 are approximated on the basis of the changes in the analogous semi-annual data on outstanding OTC contracts.

Figure 1: Financial transactions in the world economy



Source: BIS, WFE, OECD.

Spot transactions of stocks, bonds and foreign exchange have expanded roughly in tandem with nominal world GDP – therefore, the overall increase in financial trading is almost exclusively due to the spectacular boom of the derivatives markets (Figure 1).⁴ Of the latter, futures and options trading on exchanges – in which amateur investors can participate as well – has expanded much more strongly since 2000 than trading in OTC markets, which is the exclusive domain of professionals.

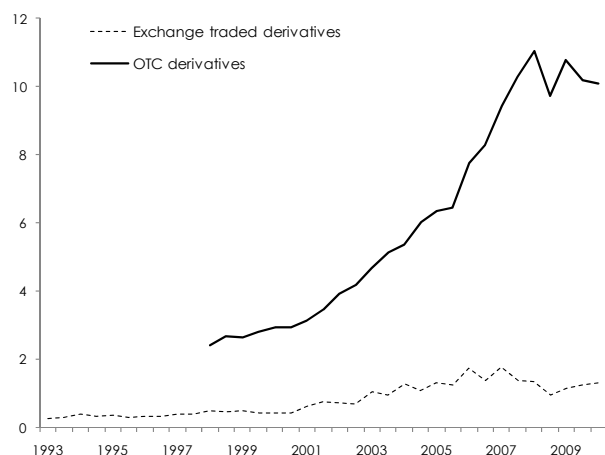
As regards the value of outstanding derivatives contracts (i.e., open interest at the end of the respective period), the picture is different. In 2009, the value of OTC contracts was on average roughly 11 times higher than world GDP whereas the value of exchange-traded derivatives surpassed world GDP by a factor of 1.2 (or by 20%). The different importance of exchange-traded versus OTC derivatives when based on transactions as compared to outstanding values reflects the essential difference between both types of markets.

Derivatives traded on exchanges are standardized instruments (futures and options) which are traded at an ever rising speed due to the progress of information technology and the related use of computer-driven trading systems. Algorithmic trading (black-box trading) and high-frequency trading in particular are methods that have evolved out of electronic trading systems, that have markedly increased productivity and have become common in major

⁴ The transaction costs for derivatives are much lower relative to their notional values than transaction costs in spot markets. Proponents of the FTT argue that it might partly offset the sharp decline in transaction costs and thus limit the implicit (excessive) leverage in derivatives markets.

financial markets (Dodd 2010, Cardella et al. 2010).⁵ For the United States it is estimated that in the last quarter of 2010, about half of the daily equity share trading volume was related to high-speed, high-frequency trading, compared to 15% in 2006 (Celent 2009).⁶ As a consequence, the turnover per outstanding contract has been rising strongly on – electronically organized – exchanges.

Figure 2: Notional value of outstanding derivatives contracts



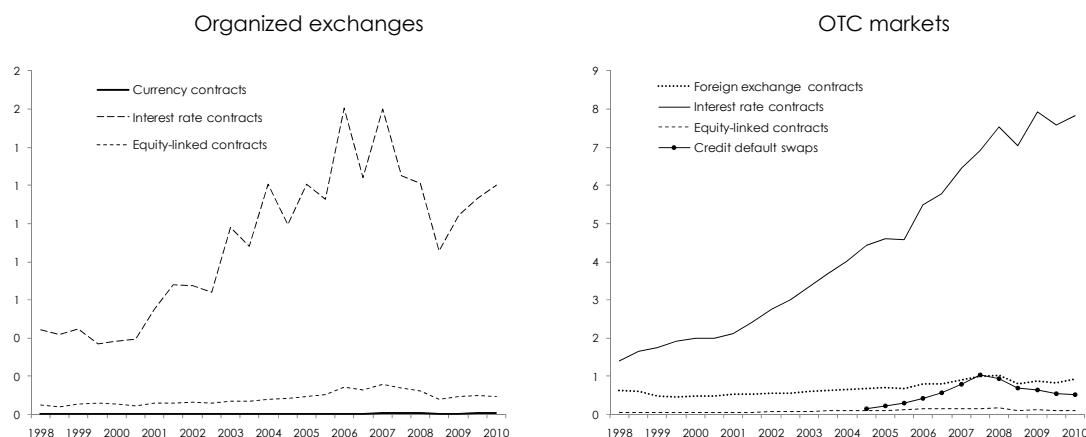
By contrast, most OTC contracts are tailored to the specific needs or interests of the two parties involved and are therefore held until expiration. This is true, in particular, for interest rates swaps and forward rates agreements. Even though there are some contracts which are traded in OTC markets (e.g., credit default swaps), the turnover per outstanding contract amounts approximately to only 2 on average (as compared to 43 in the case of exchange-traded contracts).

Figure 3 shows that on both types of derivatives markets – (i.e., exchanges as well as OTC markets) –, interest rate contracts are by far the most important instruments. The second most important instruments are equity-linked derivatives, in particular stock index futures and options. In OTC markets, credit default swaps also play a major role.

⁵ For an analysis of the impact of trading practices on asset prices, see Schulmeister (2010). The recent Triennial Central Bank Survey of Foreign Exchange and Derivatives Market Activity conducted in 2010 shows a 20% increase in global foreign exchange market activity over the past three years (King and Rime, 2010). 85% of the higher turnover is contributed to "other financial institutions" which include high-frequency traders, banks trading as clients of the biggest dealers, and online trading by retail investors. King and Rime mention market estimates suggesting that high-frequency trading accounts for around 25% of spot foreign exchange activity.

⁶ Regarding the scope of the market share of high-frequency trading in European markets, there seems to be a cautious consensus for a percentage of between 30% and 40%. See: Consultation responses to Call for Evidence on Micro-structural Issues of the European Equity Markets, <http://www.cesr-eu.org/index.php?page=responses&id=158>.

Figure 3: Notional value of outstanding derivatives by market and instruments



Source: BIS.

Based on the value of outstanding contracts, foreign exchange derivatives are of little importance both on exchanges and in OTC markets, mainly for two reasons. First, turnover per contract is high in foreign exchange markets and therefore, open interest understates their importance. Second, a great deal of foreign exchange trading is effected in the cash (spot) market because there, it is not necessary to use derivatives in order to profit from leverage effects (in contrast to stock and bond trading, see Figure 1).

4. Clearing, settlement, payment and information systems

Opponents of a financial transactions tax (FTT) point to the many ways investors may avoid it by physically transferring trading activities outside of the respective jurisdiction under which the FTT tax applies. But even if such a tax is introduced globally, one popular view is that traders may shift their activities to alternative trading systems, dark pools or offshore, or they may withhold their activities from the tax authorities when trading over the counter. But as Paul Krugman has pointed out, trading activities are dispersed locally and virtually across the globe, while as a consequence of technological innovation clearing and settlements systems have undergone a centralization process that makes avoidance of payment more difficult and less desirable, at least in the foreign exchange market.⁷

It was this enormous transformation of the clearing and settlement process observed in the last two decades, together with the increased use of cost-efficient electronic trading platforms that have instigated a new debate on the technical feasibility of introducing an FTT at a central level. Consequently, in the few studies on the implementation of a transaction

⁷ Paul Krugman. Taxing the Speculators. New York Times. 26 November 2009.

tax, clearing and settlement systems play a crucial role in the proposals of the point at which the FTT should be withheld and transferred to the respective tax collecting authority or agency (Leading Group 2010, Jetin and Denys 2005, Spratt 2006, Hillman, Kapoor, and Spratt 2006, Schmidt 2008, 2001, 2010). The feasibility of a transaction tax at the point of settlement was analyzed in particular for a Currency Transactions Tax (CTT). Proponents of a CTT argue that the global diffusion of interconnected large-value payment systems operated by central banks within which payments are settled on a gross basis in real time together with the launch, in 2002, of CLS Bank International which runs a multicurrency system for the simultaneous settlement of both sides of foreign exchange and security transactions, have facilitated the technical feasibility of automatically collecting a CTT at a centralized level. Technological advances in clearing and settlement have paved the way for making a CTT more easily manageable without significant tax avoidance. In addition, the centralized collection of the CTT is made possible at negligible administrative costs that are much lower than those collecting other taxes such as income or VAT taxes.⁸

While there are numerous technical proposals for a centralized collection of a CTT, the implementation of an overall FTT which involves transactions on exchanges as well as over the counter via settlement systems seems to be less feasible given the fact that the majority of transactions in the OTC markets (including derivatives) are still traded, cleared and settled bilaterally, although a number of clearing and settlement infrastructures do already exist. But even if all OTC transactions were cleared and settled centrally, the problem would be that not all derivative transactions are settled in the first place. If the notional value is considered to constitute the tax base, taxation at the point of settlement is not advisable given the fact that when transactions reach the settlement phase, in the course of the preceding netting process, the tax base would decrease significantly.

But with respect to securities or shares traded on exchanges, there are numerous examples of a centralized collection of transactions taxes for specific market segments of equities and securities,⁹ the most widely studied being the stamp duty¹⁰ applied in the United Kingdom. This is a global tax on share transactions in UK incorporated companies and shares in a foreign company with a share register in the UK, currently levied at 0.5% of the purchase price of shares, regardless of where the trades take place.¹¹ To account for avoidance, a rate of 1.5% is levied when shares enter a depositary receipt issuer arrangement. To be precise,

⁸ One example is the centralized collection of the UK stamp duty. Bond et al (2004) report 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.

⁹ For an overview, see Annex B.

¹⁰ Many FTTs take the form of duties that are payable for an official 'stamp' that must be attached to the transfer document if it is to be admissible as legal evidence of the change in ownership of a financial instrument.

¹¹ See <http://www.hmrc.gov.uk/sdrt/>.

stamp duty is chargeable on the purchase price of a share for which there is a legal paper instrument of transfer.

But the bulk of the tax revenue is collected through stamp duty reserve tax (SDRT), which is the equivalent tax on an agreement to transfer the share by electronic means. SDRT is levied on UK residents and nonresidents and comprises taxes on stocks, exercised equity options (tax base: strike price), futures contracts on shares, and shares in investment and unit trusts. Tax legislation provides for a number of reliefs, in particular for market intermediaries. A major part of stamp duty is collected via the electronic settlement system CREST, which is the primary settlement system for UK securities, government bonds and corporate bonds (Spratt 2006). If shares are transferred outside of CREST and are held by a nominee like a bank, the SDRT has to be paid directly to HMRC.

A general FTT involves taxation of any type of financial transaction, traditional or derivatives, over the counter or exchange-traded, wholesale or retail, national or cross-border. There are several potential venues to organize a procedure for taxation at a central level: at the point of trade via electronic trading platforms and at the point of clearing and/or settlement via CCPs or Central Security Depositories. To assess the feasibility of these options, we examine the major steps of transaction processes as well as the institutions involved.

In contrast to trades that take place on exchanges, the centralized collection of taxes on trades with securities, shares, and derivatives that are traded over the counter is less manageable. But the recent financial crisis has highlighted a severe lack of market transparency and systemic risk potentials in the OTC derivatives markets. Following the recommendations of the G20, several legislative initiatives aimed at addressing these issues have been put forward as part of the overall regulatory overhaul. One avenue to reduce the negative impact of OTC derivatives markets on financial stability is seen in the strengthened use of CCPs or trade repositories (Committee on Payments and Settlement Systems 2010). Trade repositories for OTC derivatives are centralized registries that maintain an electronic database of the records of open OTC derivatives transactions. In order to give financial regulators a complete overview of the derivatives market, the European Commission, e.g., proposes to make mandatory the reporting of all transactions on trades made on an exchange or cleared through a CCP (European Commission 2010B). These initiatives aimed at reducing counterparty risk and increasing transparency might also facilitate a centralized option for the implementation of an FTT for OTC derivatives from a technical perspective.

4.1 Clearing and settlement Systems: Definitions and recent trends

(Large value) financial transactions are conducted in three steps: First, financial market participants agree to trade and concur on instruments, prices and volumes. Financial market participants are either customers such as corporations and non-bank financial institutions (pension funds, mutual funds, hedge funds, and insurance companies) that do not trade directly with each other, but do so through intermediaries such as banks and brokers (retail

market). Or transactions take place between financial institutions (wholesale market). Trade can be conducted by telephone, via e-mail or through an electronic trading platform.

After a trade has been matched, it needs to be cleared and settled so that the seller is paid and the buyer receives ownership of the security traded. Thus, following the execution of a trade, a number of post-trading processes are set in motion. Payment, clearing and settlement systems channel the flow of payments for goods, services and financial assets. In its widest sense, clearing involves the management of post-trading, pre-settlement credit exposures to ensure that trades are settled in accordance with market rules. Clearing processes include a set of rules and procedures whereby financial institutions present and exchange data and/or documents relating to funds or securities transfers to other financial institutions at a single location (e.g., clearing house).

Settlement refers to the completion of a transaction or of transaction processing within a transfer system in a way that ensures that participants meet their obligations through the transfer of securities and/or funds. Settlement means the exchange of cash or assets in return for other assets or cash and the transference of ownership of those assets and cash.

It has to be mentioned that the post-trade processing of derivatives is much more complex than with securities clearing and settlement. With respect to the latter, the period of time between the execution of a trade and its settlement is not more than a few days. With derivatives, however, there are reciprocal obligations of the parties over the life of the contract which may last several years.

In general, instruments traded on exchanges can be easily taxed either at the point of the trade or during the settlement process.¹² Exchanges often operate clearing and settlement systems, e.g., in the United States, Italy, Spain, and Germany, while some exchanges share their post-trading infrastructure.¹³ Where clearing and settlement organizations are not owned by stock exchanges, they are generally owned in some form by their users (Cox et al. 2005). With OTC transactions, however, trading is dispersed globally. But clearing and settlement processes/procedures are to some extent centralized, varying from country to country as well as from market to market. Due to the heterogeneous nature of derivatives bilateral clearing and settlement has coexisted with centralized clearing and settlement for many decades. But centralized clearing arrangements utilizing Central Counterparty Platforms (CCPs) have become more widespread in recent years, thereby mitigating credit and counterparty risk.

¹² This statement, however, requires further clarification. The collection of taxes from the accounts of end-users (costumers) at the point of settlement requires that the respective clearing infrastructure, the central security depository (CSD), operate investor accounts (direct holding system). This is a common feature of the Nordic securities holding systems (Wallin-Norman 2005).

¹³ In some countries, however, ownership of clearing and settlement has moved out of the control of exchanges. As a result, the exchange, the clearing house and the CSD are separate organisations, each with its own shareholders, directors and management, creating a structure that is described as being split "horizontally". Examples of exchanges ceding control of clearing or settlement include the UK and the Nordic countries.

Clearing and settlement systems are critical to financial stability, they can be characterized as the central nervous system of the financial system.¹⁴ From the perspective of financial stability, a further shift from bilateral to centralized clearing and settlement is warranted.

In principle, payment, clearing and settlement systems involve large-value payment systems, securities settlement systems and retail payment systems. The first two infrastructures are mainly relevant for a possible centralized collection of transaction taxes. These infrastructures have changed significantly over the last two decades, the most striking trends being the emergence of cross-border and offshore systems, the rise of CLS Bank, and most recently, the establishment of some CCPs for OTC derivatives, such as the launch of SwapClear in 1999, a CCP for interest rate swaps between dealers. These changes have been mainly driven by three factors: the globalization of financial markets and banking, which has shaped the infrastructural landscape; technological innovations; and efforts by regulators and central banks in promoting safety, efficiency and overall financial stability. In particular central banks have taken more active roles in monitoring systems and in inducing change, for instance by promoting the shift from deferred net settlement systems in large-value payments to real-time gross settlement systems where processing and settlement take place on a transaction-by-transaction basis in real time, thereby reducing settlement risk¹⁵ and ensuring immediate finality. This shift may be particularly important for the centralized collection of a currency transactions tax (CTT) (Leading Group 2010).

4.2 Governance and regulation of payment and settlement systems

Nowadays, central banks often assume a role in the oversight of payment and settlement systems, applying internationally agreed standards to the systems falling within their scope. Their intervention is typically justified by arguing that market participants do not fully consider the consequences of their actions on the rest of the payment system and, by extension, on the rest of the economy – that is, by arguing that their actions give rise to systemic risk externalities. Many central banks continue to exert influence via the ownership of their country's large-value payment system or the operation of key components of the infrastructure. However, given increasing economies of scale and large network externalities, the financial industry itself was incentivized to concentrate the provision of payment and settlement services which interact globally, give rise to complex interdependencies and may be a source of systemic risk. In the past, public intervention, in particular by central banks, has altered financial infrastructures markedly – as was the case with the establishment of CLS

¹⁴ Michael Moskow (2006), Public policy and central counterparty clearing. Speech delivered at the European Central Bank and Federal Reserve Bank of Chicago joint conference, "Issues Related to Central Counterparty Clearing", Frankfurt, Germany, April 4.

¹⁵ Settlement risk is the risk that settlement in a transfer system will not take place as expected, usually owing to a party defaulting on one or more settlement obligations. This risk comprises, in particular, operational risks, credit risks and liquidity risks.

Bank. The financial crisis has strengthened calls for the further automation, centralization and enhanced oversight of post-trade infrastructures. In the future, this may facilitate centralized FTT collection.

4.3 Large value payment infrastructure

Large-value payment systems (LVPS) are mostly used for interbank payment transactions. These include the settlement of interbank money market operations, the cash leg of securities trades, and the euro leg of foreign exchange trades. Some customer transactions are also processed through large-value payment systems.

Efforts to harmonize and consolidate payment and securities settlement systems have been particularly prevalent with regard to large-value payment systems. One of the major trends in large-value payments was the diffusion, across the globe, of real-time gross settlement systems (mostly) operated by central banks (Bech et al. 2008). This trend was largely induced by central banks which were concerned with the systemic risks inherent in large-value net settlement systems. The world's oldest RTGS system is Fedwire, operated by the US Federal Reserve Bank. Use of an RTGS system has been a prerequisite for membership in Economic and Monetary Union (EMU). To interlink the national RTGS systems, in 1999, the Trans-European Automated Real-time Gross settlement Express Transfer (TARGET) system was established. It is operated by the Eurosystem and is used to settle central bank operations, large-value euro interbank transfers as well as other euro payments.

In 2008, TARGET2 was set up. In contrast to the decentralized institutional set up-of TARGET, TARGET2 operates on the basis of a single technical platform through which all payment orders are submitted and processed in the same technical manner. The use of TARGET is optional. However, in 2009, the market share of TARGET2, defined as the percentage of traffic flowing through all large-value payment systems operating in euro that was processed in TARGET2 was 90% in value terms and 60% in volume terms. EURO1¹⁶ the second-largest LVPS in the euro area after TARGET2, accounts for 10% in terms of value and 40% in terms of volume of all transactions processed by euro area LVPSs (ECB 2009).

Outside Europe the rate of RTGS adoption since the mid 1990s has been equally impressive. At the end of 2006, 93 of the world's 174 central banks were using RTGS systems. As already mentioned, settling on gross basis in real time minimizes the systemic risks that are inherent in large-value net settlement systems (Bech et al. 2008). But it requires more intraday liquidity, which is costly for participants and either takes the form of fees or of opportunity costs of collateral. This has induced the development of hybrid systems where some payments are

¹⁶ EBA CLEARING was established in June 1998 by 52 major European and international banks with the mission to own and operate the EURO1 large-value payment system. Today, EBA CLEARING counts 66 shareholder banks and, through its EURO1, STEP1 and STEP2 systems, offers both high-value and low-value clearing and settlement services to a wide community of banks in the European Union.

settled individually, as in RTGS, while others are pooled together and netted. One important global trend was the increase in the value settled by hybrid systems. By 2005, hybrid systems accounted for close to one-third of the total value settled compared to a market share of 3% in 1999 (Bech et al. 2010).

4.4 Multicurrency payment infrastructure

Traditionally, foreign exchange settlement was carried out bilaterally between trade parties through the use of correspondent banking arrangements. The payments of the two currencies would normally not be made simultaneously, in particular because of often fairly substantial time zone differences. The risk of paying the currency sold but not receiving the currency bought has increased efforts to reduce this so-called Herstatt (or time zones) risk.¹⁷ Foreign exchange settlement risk can be mitigated by introducing coordinating mechanisms to achieve a simultaneous exchange – so-called payment versus payment – of the two currency legs. To reduce the Herstatt risk, CLS Bank was set up in 2002. It is wholly owned by CLS Group, whose shareholders are some of the world's largest foreign exchange trading banks. CLS Bank offers a real time electronic system designed to link a number of national payments systems and to simultaneously settle on its books the foreign exchange transactions submitted by its member banks. Additionally, CLS Bank started to provide cash settlement services for non-payment versus payment single currency payment transactions, such as credit default swaps registered in the DTCC's Trade Information Warehouse.¹⁸ CLS Bank is a special-service bank under US federal law and is supervised by the Federal Reserve Bank of New York, which is working with oversight authorities in countries whose currencies are included in the CLS arrangements.

CLS has been able to significantly increase its market share. Now it is the payment infrastructure with the highest settlement value worldwide. According to a survey conducted by the BIS (2007), in 2006, 32% of the gross value of foreign exchange obligations were settled by traditional correspondent banking arrangements and 8% by bilateral netting. CLS Bank settled 55% of the total foreign exchange settlement obligations. According to recent estimates from early 2010 provided by the ECB 70% of all foreign exchange trades in the seventeen currencies for which CLS Bank offers services, are settled in CLS (ECB 2010). While

¹⁷ In June 1974, Bankhaus Herstatt, a privately owned small bank in the German city of Cologne had to go into liquidation during the period in which it was supposed to settle contracts after having received the payments from its counterparties. That failure triggered a series of cascading defaults in rapid sequence, totalling a loss of \$ 620 million for the international banking sector.

¹⁸ The DTCC (Depository Trust and Clearing Corporation) was established in 1999 and provides clearing, settlement and information services for equities, corporate and municipal bonds, government and mortgage-backed securities, money market instruments and OTC derivatives in the United States. The Trade Information Warehouse (Warehouse) is the market's first and only centralized global repository for trade reporting and post-trade processing of OTC credit derivatives contracts on the market.

the increase in market share within a short time period is impressive, the still high proportion of foreign exchange transactions that are settled via traditional channels poses a serious impediment for the centralized CTT collection.

The Leading Group (2010) proposes to collect a CTT from the settlement accounts held at the respective central bank (RTGS) before or after the funds are transferred from the RTGS system to CLS Bank. Any transactions settled within CLS pass through these national systems for each of the 17 currencies that are settled. Since settling through the respective national RTGS system is not mandatory, the introduction of a CTT would induce migration to already existing alternatives. Hence it is referred to the idea of imposing stricter capital requirements for foreign exchange transactions that are not settled centrally. Another limit to the proposal of collecting a CTT from accounts held with central banks is the incentive the tax might induce with respect to net obligations in order to avoid paying tax on the gross sum.

4.5 Central counterparties/securities settlement systems

The securities market infrastructure comprises all the arrangements and technical facilities related to the issuance, listing, trading, clearing and settlement of securities and derivatives transactions. Clearance and settlement functions are often divided between separate entities. One entity, the CCP, provides clearance services such as trade comparisons (agreement on trade terms and the contract's existence), continuous net settlement accounting (the netting of each participant's daily purchases and sales to obtain a daily net receive or deliver obligation), and trade-for-trade accounting (the separate accounting for each participant's daily purchases). A different entity, the central securities depository (CSD), provides settlement services including custody (with the immobilization of stock certificates) and the transfer of stock ownership by bookentry settlement.

Derivatives: Today, two parallel systems exist for clearing and settling derivatives: bilateral clearing and settlement and CCP clearing and settlement. Most OTC derivatives are settled bilaterally, that is, by the counterparties to each contract. The same holds true for collateralization. To give an example, 50% of OTC derivatives trades are still confirmed on paper.¹⁹ Until very recently, in Europe Credit Default Swaps (CDSs) were cleared solely on a bilateral basis. Following the critical role those instruments have played during the financial crisis, some support the idea of having at least one CCP for CDS that is located in Europe.²⁰ It is widely recognized that the post-trade infrastructure of derivatives, and in particular of CDSs falls short of the dramatic rise in the trade of these instruments we have observed over the last decade (see Section 6).

¹⁹ Market Press release of 21 July 2008 entitled "DTCC and Markit to Form Strategic OTC Derivatives Partnership". Cited in ECB 2009.

²⁰ There are five existing or proposed providers of a European CCP for CDSs: Eurex Clearing, LCH.Clearnet Ltd., LCH.Clearnet SA, ICE Clear Europe and the Chicago Mercantile Exchange (CME).

Most exchange-traded derivatives and some OTC derivatives are cleared and settled through a CCP.²¹ Clearing and settlement for OTC derivatives is a more recent phenomenon. CCPs initially emerged to support trade on derivatives (futures) exchanges. With long pre-settlement periods, agents are exposed to 'replacement cost risk', i.e., the risk that, before settlement, the counterparty defaults and the trade has to be replaced – potentially at a loss. With anonymous trading, agents would be reluctant to carry such counterparty risk and hence central counterparty clearing emerged as a vehicle by which each party transacts with a high-quality counterparty. Under CCP arrangements, the two counterparties of a transaction replace the claims and obligations vis-à-vis each other with separate claims and obligations against the clearing house (novation). The CCP manages its risk by requiring traders to post collateral ("margin") on their positions, which is adjusted on a daily basis or at even higher frequencies, if necessary. Should any of the counterparties of the CCP be unable to meet their obligations, their position is liquidated and any shortfall is covered by the posted margin. The establishment of a CCP can provide two major benefits: multilateral netting and a reduction of counterparty risk.

Clearing procedures work differently for exchange-traded derivatives and for OTC derivatives. While for exchange-traded derivatives, the CCP catches the trade information from the trading platform automatically and in real time, there is no automated linkage between the CCP and the trading platform for OTC derivatives, as trades are pre-negotiated bilaterally. In this case the participant has to send the respective trade information to the CCP (Elliot et al. 2009).

Securities: CSDs play a crucial role in the settlement of securities. They typically operate the securities settlement system (SSS) in which trades are settled (the transfer of securities in exchange for the agreed settlement asset). CSDs perform functions such as corporate actions (calculation of dividends, etc.), custody (the safe-keeping of securities) and sometimes also stock lending, repo and collateral management. In the early 1970s, the international central securities depositories (ICSDs), Euroclear Bank and Cedel (now Clearstream Banking Luxembourg) were established to provide CSD services for the Eurobond market.

Today, despite the introduction of the euro more than ten years ago, the provision of post-trading services for securities remains heavily fragmented along national lines. For example, in 2008 25 CSDs and ICSDs still operated in the euro area (ECB 2009) – at least one CSD per country. In order to harmonise the currently highly fragmented securities settlement infrastructure in Europe, the Eurosystem plans to operate an IT platform (TARGET2-Securities) for the settlement of almost all bonds and equities that are traded in Europe.²²

²¹ Outstanding exchange-traded derivatives account for less than 20% of outstanding OTC derivatives (Figure 2).

²² TARGET2 Securities is a single technical platform consisting of a settlement engine to support processing by CSDs using T2S services to transfer orders of participants of CSDs and a database holding relevant static data, including

The consolidation process in the United States, unlike that in the euro area, was initiated several decades ago. The US now has a very streamlined trading and settlement environment featuring the DTCC which is responsible for the clearing and settlement of all equities and corporate bonds, and the Federal Reserve System, which is responsible for government bonds.

4.6 Service providers

Proponents of a centralised solution to the collection of a CTT refer to the fact that messaging providers such as SWIFT (Society for Worldwide Interbank Financial Telecommunication) dispose over transaction data that could be used by tax collecting agencies or authorities (Leading Group 2010). SWIFT supplies messaging services to financial institutions and market infrastructures worldwide, but does not hold accounts for its members and does not perform any form of clearing or settlement. There are two major limitations to this proposal of the Leading Group: First, the majority of international interbank messages use the SWIFT network – as at July 2010, SWIFT linked over 9,000 financial institutions in 208 countries.²³ However, using its services is not obligatory. Alternative messaging providers exist – such as British Telecom, which accounts for a large share of the UK market. Second, SWIFT, is a private company and owned by its member financial institutions. The decision which data are collected and stored for a longer time period is taken by representatives of its owners.²⁴ For example, with respect to derivatives no notional values can be retrieved from the messaging forms.

Another possibility for a centralized FTT collection would be – at least for a specific market segment – to use trade repository data for OTC derivatives. The European Commission suggested to make it mandatory that all derivatives transactions are reported to trade repositories (see Section 6).

5. The debate on features of optimal institutional models of clearing and settlement systems – the case of the European Union

The financial crisis has rephrased the debate on which institutional model of a clearing and settlement system serves best in terms of efficiency, safety and soundness. In recent years, the emphasis of the debate has shifted from efficiency considerations to concerns about systemic financial stability.

data related to the securities accounts maintained by CSDs and the cash accounts maintained by national central banks.

²³ http://www.swift.com/about_swift/company_information/swift_in_figures/archive/index.page?lang=en, SWIFT 2010.

²⁴ Given its systemic relevance the central banks of the G10 and the ECB have agreed on a cooperative oversight arrangement with the National Bank of Belgium acting as the lead overseer. But this oversight function focuses on financial stability.

Prior to the financial crisis, in the EU, the highly fragmented infrastructure for clearing and settlement which is essentially based on different national structures for securities trading and post-trading systems was a major concern, because it was perceived as an impediment to integrated capital markets. By eliminating cross-border institutional and legal barriers including transaction taxes (Lamfalussy Report 2001), the reduction in these barriers would increase EU financial integration by improving economies of scale and scope in cross-border trading and by reducing transaction costs for issuers and investors (Giovannini Reports 2001, 2003).

While the Giovannini Report has supported EU legislative intervention to reduce these barriers, others have contended that consolidation should be left to market forces supported by rigorous principles of competition law (Milne 2007). Finally, EU policy avoided legislative intervention and instead has used the instrument of a voluntary code of conduct to encourage exchanges, clearing houses, and settlement depositories to improve price transparency and to increase access and interoperability in the post-trading sector (European Parliament 2009). The main objective for interoperability is to give trading firms a choice of which CCP to use. These initiatives together with market pressure have led to some horizontal consolidation through a series of mergers between international CSDs (e.g., Euroclear) and national CSDs (e.g., Franc's Sicovam), while in parallel, vertical silos (e.g., Deutsche Bank acquiring Clearstream) have been created as well. Furthermore, exchanges were following the strategy of acquiring clearing houses that promote vertical integration. With the degree of fragmentation along vertical structures remaining still high, the question has been raised whether a more coherent institutional approach including legislative intervention is needed to promote horizontal access between the large CCPs to consolidate clearing in Europe (European Parliament 2009).

While prior to the crisis regulatory interest in centralized clearing was primarily driven by efforts to improve price transparency and to decrease the costs for cross-border securities trading, the financial crisis has put a spotlight on market failure and systemic risk in post-trading systems. The dramatic increase in derivatives trading, in particular in CDSs and synthetic collateralized debt obligations, and the technical problems in processing these trades and determining their exposure for counterparties have prompted proposals to establish central clearing for derivatives, in particular for CDSs. The proposals range from establishing a single EU CCP²⁵, single CCPs for single instruments (i.e., a CCP for CDSs a CCP for interest derivatives etc.) or multiple CCPs that clear various derivative instruments. The latter proposal was finally implemented in the US (Dodd-Frank Act 2010) and resembles the legislative proposal of the European Commission of September 2010 (European Commission 2010B). Each of these proposals encounters specific risks and risk reduction benefits.

²⁵ In 2001, the Lamfalussy Committee has asked that policymakers consider "the prudential implications of one central counterparty".

A single CCP²⁶ would diversify its exposures across heterogeneous products and markets, and net across multiple assets and standardized financial instruments. It would allow for more efficient netting of transactions across a wide range of instruments leading to economies of scale in collateral management and information technology. However, a single CCP might add to systemic risk due to the related massive concentration of various sources of risk within one institution. The "too big to fail" problem might create the familiar problem of moral hazard, which demands close regulatory oversight of the CCP's risk modelling procedures, including the CCP's exposure to macroeconomic risk. It is also argued, that the ownership and corporate governance structure of the CCP might create the problem of an asymmetric flow of information between the regulators and the owners of the clearinghouse.

A similar argument applies to the establishment of a single CCP for single instruments. A CCP for a single instrument may concentrate, rather than disperse risk (Duffie and Zhu 2009). This is the case, in particular, if the subset of dealers clearing through the same CCP is not large enough. In this case, the CCP would not be able to diversify risk across heterogeneous products and markets or to spread risk across a large number of CCP members.

Multiple CCPs that clear various derivative instruments face the possibility of a so-called 'race to the bottom', for instance by competing in offering less stringent margin requirements, lower default contributions or lower access requirements (Committee on Payment and Settlement Systems 2010).

It follows that clearing multilaterally across instruments and counterparties may increase overall benefits, but requires prudent regulatory oversight to avoid the moral hazard embedded in the "too big fail" feature of a central clearinghouse. Another open issue is that of non-standardized derivatives which are often complex and for which statistical risk measurement is unreliable or even impossible. They will not be forced to central clearing,²⁷ above all because these instruments would place the CCP at systemic risk. Instruments, such as complex collateralized debt obligations and CDSs would not be cleared centrally.²⁸ These were the markets that collapsed in the course of the subprime crisis with no pricing or liquidity. Another concern of regulators refers to foreign exchange settlement risk. With the establishment of CLS Bank in 2002, these risks have been mitigated, in particular in the recent financial crisis; foreign exchange settlement has worked smoothly. But still more than 30% of

²⁶ Within the single CCP approach, two models can be applied (European Parliament 2009): The first model would be that of a single European CCP sandwiched between many competing trading and settlement platforms (similar to the US DTCC). The second model can be conceived as a network of European CCPs.

²⁷ See Dodd-Frank Act (2010) as well as a legislative proposal by the European Commission (2010B).

²⁸ Wallace Turbeville, former Vice President of Goldman, Sachs & Co, has put forward the following argument: "One could sensibly question whether banks should be entering into transactions if the risks cannot be measured with sufficient accuracy to justify clearing. Wallace C. Turbeville, Derivatives Clearing: At the End of the Beginning, Monday, 08/23/2010 - 10:57, <http://www.newdeal20.org/2010/08/23/derivatives-clearing-at-the-end-of-the-beginning-18210/>.

transactions in the foreign exchange market are not settled with CLS Bank. In its report on reducing foreign exchange settlement risk, the BIS points to the necessity of action to "tackle remaining exposures and to guard against the risk of reversing progress that has already been achieved" (Committee on Payment and Settlement Systems 2008).

6. Settlement systems and the implementation of a general FTT

6.1 Under present conditions

A general FTT takes a comprehensive approach (Schulmeister et al. 2008). The tax base comprises traditional spot (e.g., equities, securities) as well as derivatives transactions (primarily forwards, futures, options and swaps related to exchange rates, interest rates, stock prices, commodity prices and credit risks), transactions that are carried out on organized exchanges as well as transactions carried out bilaterally or "over the counter". Transactions on organized exchanges include instruments traded on a traditional stock exchange (e.g., the New York Stock Exchange) as well as derivative instruments carried out on derivatives exchanges (e.g., Eurex in Frankfurt, Euronext in London or the Chicago Mercantile Exchange/CME). On most exchanges clearing and settlement are conducted by clearing and settlement agents (CCPs or CSDs) which are supported by electronic trading platforms (see Annex A). In the following, the feasibility of a centralised implementation of an FTT is analysed for three categories: transactions on exchanges, OTC and foreign exchange transactions. The latter comprises both exchange-traded and OTC-traded instruments. Given the large size of the foreign exchange market (King and Rime 2010) and the long history of recommendations to introduce a currency transactions tax (CCT) this category is treated separately.

6.1.1 Transactions on exchanges

Implementing an FTT on instruments traded on exchanges seems to be straightforward and is now common practice in some EU countries. Out of the twelve EU-countries levying an FTT²⁹, Belgium, France, Greece, Ireland, Cyprus and the UK apply transaction taxes to stock exchange-based securities trading. Collecting FTTs is facilitated by the high degree of market regulation of exchanges and their reliance on clearing houses.

The main drawback of centralized collection is that this incentivizes migration to bilateral trading. Depending on the size of the tax rate and the tax base, migration to non-FTT exchanges might also be a plausible reaction of market participants. Sweden's experience serves as a well-documented case study of cross-border migration (Campbell and Froot

²⁹ Either transfer taxes or stamp duties or both are levied in Belgium, Finland, France, Greece, Ireland, Italy, Malta, Poland, Portugal, Hungary, Cyprus and the UK (see Annex B).

1993).³⁰ In the EU, half of all financial transactions are carried out on organised exchanges, the other half is traded over the counter (BIS 2010). If individual countries that host exchanges with a high market share implementing an FTT unilaterally this raises the question of tax revenue sharing. The share in the transaction volume (measured in terms of notional values) traded on derivatives exchanges in Germany and the UK is 70% of overall derivatives trading on EU exchanges (see Schulmeister 2011).

The clearing and settlement of transactions traded on exchanges is mostly effected by CSDs or CCPs. In most of the EU Member States which that levy some kind of transaction tax on the transfer of securities, the responsibility for tax collection is with the parties to the trade or their agents (see Annex B). In rare cases the responsibility for tax collection is with the settlement service providers. There are two EU Member States that impose a tax on securities transactions for which the responsibility for collection is imposed on settlement service providers: the United Kingdom, which charges Stamp Duty Reserve Tax (SDRT) on transactions in chargeable securities held in electronic form; and Ireland, which charges stamp duty on instruments that affect transfers on the sale of registered securities in Irish companies or equitable interests in Irish securities. The SDRT and the stamp duty in the UK deserve particular attention because the techniques implemented to collect these taxes contributes to the minimization of tax avoidance. Transactions with shares issued by UK incorporated companies depend on the payment of the stamp duty, irrespective of where the transaction takes place.

6.1.2 *Over the counter transactions*

In principle, an FTT on OTC-traded could be collected by clearinghouses following the same approach the UK applies in collecting the SDRT. But at present, the clearing and settlement of OTC transactions follow various avenues making a comprehensive FTT at the point of settlement not feasible. With respect to market organization and to the regulatory environment, one must distinguish between non-exchange traded *equities, bonds and money market instruments* on the one hand and *OTC derivatives on the other*. While the first category of financial instruments has structural features that facilitate the administration of an FTT, the decentralized, intransparent and less regulated structure of the OTC markets makes the centralized collection of FTTs less easily manageable.

Market participants for OTC trading in bonds and equities include issuers such as governments and firms, banks, institutional investors and individuals. Settlement services for *securities and equities* that are not listed on an exchange and that are traded bilaterally OTC or at other trading venues, such as private markets) are offered by CSDs, which operate

³⁰ The migration experience of Sweden in the 1980s is often cited as an argument against the implementation of FTTs. However, a multilateral, all-encompassing FTT should minimize migration, both geographically and with respect to avoidance by substituting taxed financial instruments by nontaxed ones.

securities settlement systems. Clearing functions are offered by CCPs. But if two counterparties that agree to exchange a certain amount of securities or equities for a certain amount of funds use the same custodian bank, often no clearing or settlement agents, such as a CCP and/or a CSD, are involved. But even if two different custodian banks are used, the banks involved in the transaction are not legally required to involve their national CSDs but may make use of their own infrastructure or may wish to use CSDs abroad.

Taxing financial transactions involving securities or equities that are traded bilaterally would require mandatory settlement through CSDs. Another prerequisite would be that end-investors are recorded in the books of the respected CSD. This so-called 'direct holding system' exists in several European countries (e.g., Denmark, Finland, Greece, Slovenia and Sweden) as well as outside Europe (e.g., in the Middle East, South-East Asia and China). In an 'indirect holding system', however end-users are not necessarily recognised at the level of the CSD. Instead, blocks of securities are held in intermediaries (custodian banks) accounts with the CSD (so-called omnibus accounts) grouping together the holdings of several investors in one single account with the CSD. These intermediaries then manage the end-investor's accounts in their own systems. Custodians can forward settlement instructions to the CSD, or if both counterparties are customers of the same custodian bank, execute the transaction in their own accounts (internalised settlement). Indirect holding systems are e.g., applied by international central securities depositories (ICSDs). It follows that a comprehensive taxation of bilateral securities or equity trading would require the mandatory implementation of 'direct holding systems' within prevailing holding structures where a CSD holds accounts for all end-investors. But in general, the existing infrastructure for trading securities over the counter as well as the reporting requirements applicable to individual transactions in some countries facilitate the administration of an FTT.

With respect to *derivatives*, the vast majority of derivatives is still traded bilaterally with counterparties using their own internal clearing and settlement systems or making use of third-party providers. The OTC derivatives market provides for a large number of – sometimes complex and opaque – financial instruments which can be tailored to the specific needs of the counterparties. While transactions with bonds or equities involve one single payment, modalities of actual payment transactions vary across the wide range of derivative instruments. Payments (cash flow settlement) with respect to derivatives contracts are settled in a number of ways. Either through payment systems or through correspondent banking, where the two financial institutions handle the sorting and processing of payments themselves without involving an intermediary (ECB 2010). Where contracts are cleared by a CCP, the CCP may offer services relating to cash-flow settlement. It is important to note that CCPs restrict direct participation to the most creditworthy sub-set of market participants. Market participants that are not clearing members need to establish an account relationship with a CCP-member in order to effect settlement. But clearing members are normally required to hold two groups of accounts at the clearing house: one for their own assets, collateral and

positions, and the other for their costumers (ECB 2010). This makes a CPP a potential candidate for FTT tax collection for derivatives transactions.

The post-trading infrastructure for clearing and settling had already changed before the financial crisis. CCP clearing has been available for a range of OTC interest rate swaps since 1999 and for selected OTC equity derivatives since 2005. The first CCP services for credit default swaps were launched at the end of 2008. Such services were introduced by Eurex Clearing and LCH. Clearnet SA in 2008 and 2010 respectively. Until now, however, most euro-denominated OTC credit derivatives contracts submitted to a CCP have been cleared by ICE Clear Europe, a UK-based subsidiary of the US Intercontinental Exchange, which began operations in 2008 (ECB 2010). But according to the ECB, the current share of OTC-trades cleared in CCPs is still low; i.e., it is less than 10% for CDSs.

At the current juncture a comprehensive collection of an FTT on OTC transactions at point of clearing or settlement is not feasible. But tax collection is still possible, and numerous examples exist in practice, i.e., a decentralized approach under which the tax is charged from the banking or broker accounts of the resident to whom the FTT applies (Schulmeister 2011).³¹ This approach allows individual countries or a group of countries to introduce an FTT in such a way that the competitiveness of their own financial markets and institutions would not be gravely affected, because any resident of an FTT country who orders a financial transaction to be carried out in their home country or abroad is legally the debtor of the FTT ("personal principle"). There are a few examples in the EU where non-exchange traded securities transactions are taxed: Portugal, Hungary, Italy, Finland, Malta and Poland (See Annex B).

6.1.3 Foreign exchange transactions

The market for foreign exchange transactions is increasingly highly concentrated, with a disproportionate large share of transactions being conducted by few financial institutions (banks and dealers) – whose number has been on a steady decline over the last ten years – within a few countries (UK, US, Japan, Singapore, Switzerland, Hong Kong and Australia).³² Cross-border transaction represent 65% of trading activity, while local transactions account for 35% (BIS 2010). Market participants are large banks as well as 'other financial institutions', such as smaller banks, mutual funds, money market funds, insurance companies, pension or hedge funds.

While the long-term trend towards the greater concentration of foreign exchange trading with a few global banks continues, a rise in the trading activity of 'other financial institutions' can be observed. This category accounts for 85% of the 20% increase in global foreign

³¹ OTC transactions are conducted by a large number of market participants. Charging the tax on market participants incurs rather high administrative costs and increases the scope for tax avoidance.

³² Ten countries account for 90% of global foreign exchange turnover (King and Rime 2010).

exchange market activity over the three years up to 2010 (King and Rime 2010). Another long-term trend has been the growing importance of real investors (households and non-bank institutions) in foreign exchange activity. These trends have been spurred by investments in electronic execution methods that significantly lowered transaction costs and paved the way for the growth of algorithmic trading. The cost-effectiveness of electronic trading has also encouraged the entry of new participants in global foreign exchange markets.

Among the structural characteristics that impede the ready implementation of an FTT, the high importance of OTC trading, which often involves counterparties located in different countries, as well as the global nature of the foreign exchange market, which facilitates migration to non-tax jurisdictions, have to be mentioned. By contrast, the centralization of payment and settlement systems, such as CLS Bank and the above mentioned large value-payment systems, is often viewed as a major structural feature that makes the implementation of a CTT more feasible. The CTT could be charged and collected on each settled transaction similar to the way the UK collects the SDRT through the clearinghouse CREST.

In general, there are two key challenges in the settlement of foreign exchange transactions. First, for each foreign exchange trade, there will be two payment delivery legs, one in each currency. Traditionally, the two legs were processed independently in separate systems serving the respective currencies (e.g., using traditional settlement methods such as correspondent banking with no direct link between the two currency legs). Second, owing to time zone differences, the settlement of the two legs is unlikely to be synchronised. To address this foreign exchange settlement risk, "payment versus payment" (PvP) mechanisms have been introduced to link the two settlement legs and make them conditional on each other.

The most prominent example of a PvP mechanism is the Continuous Linked Settlement (CLS) system. CLS Bank is a special-purpose bank legally incorporated in New York. Having initially started with seven major currencies, CLS Bank has progressively broadened its range and now offers services in 17 currencies. These currencies cover almost 95% of the estimated total worldwide turnover in foreign exchange. Estimates from early 2010 indicate that some 70% of all foreign exchange trades in these currencies are settled in CLS Bank. In addition to settling foreign exchange trades, CLS Bank also settles certain types of non-PvP transactions, including transactions denominated in euro (i.e., credit derivatives transactions and non-deliverable forward foreign exchange transactions – ECB 2010).

Supporters of a CTT argue that CLS Bank might be used as a channel to levy the CTT. In particular, it is argued that the CTT could be collected through settlement accounts held at the respective central bank, before or after the funds are transferred from the RTGS system to the CLS Bank (Leading Group 2010). But this incurs the major difficulty that payment is effected in real time, through the national payment system of the relevant currency, after a multilateral netting process which reduces the actual payments to a small fraction of their gross amounts. It follows that the CTT cannot be collected when transactions are made through the national payment system of the central bank, because a large part of the gross

amount would not be taxed. Denys and Jetin (2005) suggest collecting the CTT at the settlement stage through the inner CLS system, when each leg of a transaction is matched on a PvP basis. This approach requires that each transaction settled through CLS is identified individually at an early stage.

This should be straightforward for settlement members which can submit instructions directly to CLS Bank for the settlement of foreign exchange trades. They hold an account with CLS Bank, with sub-accounts in all currencies eligible in CLS. User members, however, can also submit instructions directly to CLS. However, they do not hold accounts with CLS Bank and therefore settle their transactions via a settlement member subject to a bilateral agreement. Both settlement members and user members can provide CLS settlement third-party services to other banks or corporate customers that are not participants in the CLS system. Their transactions must be settled via a CLS settlement member. It follows that all types of transactions should be perfectly identified and controlled through the accounts of the settlement members.

If CLS engaged in the multilateral settling of all foreign exchange transactions, levying the CTT at this point would be straightforward, provided that the individual identification of each transaction also for parties that do not hold an account with CLS Bank, is guaranteed. Furthermore, it has to be taken into account that the implementation of a CTT may increase incentives for banks to net obligations so as to avoid paying tax on the gross sum. To answer the question whether the collected tax revenues are transferred to the fiscal agencies of the countries where the traders are located or to the country whose currency was used in the transaction is beyond the scope of this paper.

The most significant argument against levying a CTT at the point of settlement through CLS is the practice of using traditional settlement procedures, i.e., through correspondent banking or bilateral netting, in foreign exchange transactions. Charging the CLS with the responsibility of collecting an FTT would incentivize migration to non-taxed settlement systems. To avoid migration of this kind, the Leading Group (2010) has suggested applying stricter capital requirements for foreign exchange transactions settled with non-tax settlement systems. An alternative approach would consist of a procedure combining centralised tax collection by CLS Bank and large-value payment systems with a decentralized approach. The latter would imply that for those foreign exchange transactions that are not centrally cleared the tax is collected through market participants, such as banks, dealers or non-bank traders. Given the large size of the foreign exchange market, this approach is particularly challenging.

6.2 FTT implementation under the conditions of the forthcoming financial architecture

6.2.1 Post-trading infrastructure

The intensification of financial turmoils after the default of Lehman Brothers in 2008 has not only substantiated the need for thorough regulatory reform, it has also triggered calls for the

establishment of market infrastructures for OTC derivatives. The latter have created substantial systemic risks and proved to be less resilient than markets with adequate infrastructures and proper risk management. Furthermore, counterparty credit risk has played a pivotal role in the financial crisis due to the insolvency of financial institutions such as AIG, Bear Sterns, Lehman Brothers, Fannie Mae and Freddie Mac. This has led policymakers to propose laws that would require most standard OTC derivatives to be centrally cleared. Central clearing involves a central counterparty (CCP) intermediating a transaction and acting as an insurer of counterparty risk. In the regulatory reforms that concern derivatives, central clearing represents the dominant solution to the severe problem of counterparty risk. Part of the G20's agenda was to make the central clearing of OTC derivatives, if sufficiently standardized, mandatory by end 2012, while non-centrally cleared contracts should be subject to higher capital requirements. According to the ECB, the current low share of OTC-trades cleared in CCPs could increase from currently less than 10% for CDS and a bit higher for other derivative instruments to 80-90% of OTC trades.³³ In addition, contracts should be reported to trade repositories.³⁴ This should significantly enhance information on OTC derivatives exposures.

Following the G20 initiative, the Committee on Payment and Settlement Systems (CPSS) and the International Organization of Securities Commissions (IOSCO) provide guidance on how OTC derivatives' CCPs and trade repositories may increase their resilience.

In its communications on the reform of the derivatives markets, the European Commission has identified four main policy objectives (European Commission 2009): to (i) increase standardization of derivatives contracts, (ii) increase the use of trade repositories, (iii) mandate the use of CCPs for standardized OTC derivatives, and (iv) increase the use of organized trading venues. These reforms seek to reduce counterparty and operational risk, increase transparency, and enhance market integrity and oversight.

In September 2010 the European Commission proposed the Regulation on European Market Infrastructure (EMIR) that aims at bringing more safety and more transparency to the OTC-derivatives market (European Commission 2010B). In particular, the European Commission proposes that standard OTC derivative contracts be cleared through CCPs. These CCPs, which will assume and concentrate significant risk, would have to be subject to uniform prudential standards in the EU. For central implementation of an FT, the mandatory central clearing of all OTC derivatives would be advantageous. However, the proposal foresees several exemptions.

First, following the G20 recommendation, central clearing applies to standardized contracts, i.e., contracts that are eligible for clearing by CCPs. Contracts that are not eligible for

³³ Tumpel-Gugerell, Gertrude. Clearing of derivatives must be at core of reforms. Financial Times, June 23 2010.

³⁴ http://www.g20.org/Documents/pittsburgh_summit_leaders_statement_250909.pdf.

clearing are e.g., contracts that involve risks that are difficult to measure and would put the clearinghouse at risk. A particular procedure consisting of two approaches is proposed to determine which contracts must be centrally cleared. At the outset a CCP decides to clear certain contracts and is authorised to do so by the regulatory authority. In order to ensure that as many OTC contracts as possible will be cleared, this 'bottom-up' approach is complemented by a 'top-down' approach according to which the European Securities and Markets Authority (ESMA), together with the European Systemic Risk Board (ESRB), will determine which contracts should potentially be subject to the clearing obligation. This process is important to identify and capture those contracts in the market that are not yet being cleared by a CCP.

Second, in principle, the regulation does not apply to non-financial firms. But if they take systemically important positions in OTC derivatives, they are not exempt from the clearing obligations. The identification of non-financial institutions with systemically important positions in OTC derivatives is based on the definition of two thresholds, which will be specified by the European Commission on the basis of draft regulatory standards proposed by the ESMA, upon consultation with the ESRB and other relevant authorities: an information threshold, and a clearing threshold. Both thresholds will be defined for the sum of net positions and exposures by counterparty by class of derivatives. The information threshold refers to the size of positions in OTC derivatives. If the positions of the firm in question exceed the information threshold, the firm is obliged to notify the authority of this fact and will be subject to the reporting obligation. However, if the position of the firm exceeds the clearing threshold, it will become subject to the clearing obligation. The draft regulation also makes clear that when calculating the clearing threshold derivative contracts should not be taken into account if they arise from objectively measurable commercial activity.

Third, the regulation does not apply to the members of the European System of Central Banks (ESCB), public bodies charged with or intervening in the management of public debt, or to multilateral development banks to avoid limiting their powers to intervene to stabilize the market if and when required (Article 1(4)).

It follows that the proposed legislation does not ensure an all-encompassing broad coverage of OTC-derivatives that will be forced into central clearing. For OTC-transactions that are not centrally cleared, a separate tax collection procedure might be established for charging the counterparties with the respective tax. This increases the administrative burden and the risk of underreporting and tax avoidance. Given the fact that the regulation does not determine further details, such as regarding the thresholds above which the central clearing of OTC derivatives of non-financial institutions becomes mandatory, the prospective share of OTC derivatives that will be cleared centrally in overall OTC derivatives cannot be estimated.

Another issue concerns the question whether reporting requirements can be utilized in some way for the centralized collection of FTTs. Proponents argue that if all derivatives that are cleared centrally as well as those that still cleared over the counter had to reported to trade

repositories, this could be used to transfer details on transactions to national tax revenue authorities.

Financial counterparties and non-financial counterparties whose activities exceed certain information thresholds to be determined by the European Commission (based on draft regulatory standards developed by ESMA and ESRB) will be required to report details of all their OTC derivatives contracts (including those entered into with non-financial counterparties) to a registered trade repository within one day, or, where the repository is not able to record that information, to the relevant competent authority. The reporting obligation will apply to financial counterparties in respect of all OTC derivatives contracts whether or not they are centrally cleared. Those reports shall at least contain the parties to the contract as well as the main characteristics of the contract, including the type, underlying, maturity and notional value.

The European Commission will adopt regulatory standards for such reports based on drafts to be published by ESMA. (This is a more lenient requirement than the US position under the Dodd-Frank ACT, which requires that all OTC Derivative contracts, including bilateral bespoke deals, need to be publically reported on a "real time" basis, as soon as technically practicable, subject to certain limited exceptions for block trades.)

The OTC Draft Regulation requires repositories to be authorized and supervised by ESMA and sets out a framework of harmonized standards to ensure that information is reliable and secure. Trade repositories must be established in the EU, but overseas repositories may be recognized by ESMA if the relevant overseas jurisdiction provides appropriate supervision and if international information-sharing agreements are in place. As a result, information on the risks inherent in OTC derivatives markets will be centrally stored and easily accessible to ESMA, the relevant competent authorities and the relevant central banks of the ESCB. Data are collected for regulatory purposes and are subject to strict confidentiality requirements (Article 20 and 21). Any exchange and transmittance of confidential information is subject to conditions of professional secrecy.

On 24 May 2011 the Economic and Monetary Affairs Committee of the European Parliament voted on the EMIR text with some amendments made to the draft regulation, in particular concerning the role of ESMA and public transparency requirements. The European Parliament and the European Council still have to jointly adopt the regulation. The EU draft derivatives regulation mirrors Title VII and VIII of the Dodd-Frank Act that was adopted in the US in July 2010.³⁵ But most of the regulatory rules in the Dodd-Frank Act are still in the process of being finalized by the US regulatory bodies.

³⁵ See Dodd-Frank Wall Street Reform and Consumer Protection Act (2010). On May 2010, also Japan amended the Financial Instruments and Exchange Law imposing an obligation on securities companies and banks to clear over-the-counter (OTC) derivatives through a central counterparty.

However, in this respect there are some differences between Europe and the US.³⁶ First, regarding eligibility, both EMIR and the Dodd-Frank Act stipulate mandatory central clearing and reporting for a broadly defined class of OTC derivatives and provide regulators with the authority to decide when a clearing obligation should apply. While EMIR more generally applies to derivatives on specified underlying assets, with ESMA determining what constitutes an eligible class of derivatives for mandatory clearing, the Dodd-Frank Act enumerates the specific instruments as well as the general features of the swaps subject to central clearing requirements. Counterparties that are not "financial entities," and that use swaps to hedge or mitigate commercial risks are exempt from central clearing. Furthermore, the Treasury Secretary may exempt both foreign exchange swaps and forwards from the clearing obligation. The statute further exempts commodity swaps for which the physical delivery of the respective commodity is contemplated. But transactions are still subject to reporting requirements.

Second, EMIR applies to the post-trading infrastructure. The Dodd-Frank Act, however, stipulates that contracts subject to mandatory clearing are also required to be traded on exchanges or electronic platforms.

In conclusion, the clearing and reporting requirements for derivatives laid down in EMIR as well as in the Dodd-Frank Act will fundamentally change the way OTC derivatives are traded and settled, thus decreasing counterparty risk and adding transparency to a market that has traditionally been opaque. Moreover, it paves the way for the centralized collection of FTTs at clearinghouses (or at exchanges in the US). Exemptions of foreign exchange swaps and forwards or of non-financial corporations from central clearing, however, pose major challenges to this approach. According to the BIS (2010) the share of non-financial counterparties, measured by their notion values, in global OTC derivatives transactions was 8.5% at the end of the first half of 2010. 15.5% of OTC foreign exchange derivatives transactions are conducted by non-financial counterparties. But even if the legislation does not provide for the full coverage of OTC derivatives that are subject to mandatory central clearing counterparties, transactions that are bilaterally traded may still be charged with an FTT and legally required to remit the revenue to the government. However, with OTC transactions not centrally cleared the risk of underreporting tax liabilities might be high.

6.2.2 *Securities settlement infrastructure*

Another area of regulatory initiative is the effort to harmonize and integrate the highly fragmented European securities settlement infrastructure with the aim of creating an integrated, safe and efficient financial market infrastructure in Europe. In July 2008, the Governing Council of the ECB decided to launch the TARGET2- Securities (T2S) project to

³⁶ See also European Parliament (2011).

overcome the current fragmentation of the European settlement infrastructure. T2S constitutes a major step forward in the delivery of a single integrated securities market. The objective is to achieve harmonized and commoditized delivery-versus-payment settlement in central bank money in euro (and possibly other currencies) in virtually all securities in Europe. T2S expands the ECB's TARGET system to include the settlement of payments for cash financial instruments (i.e., equities and bonds) which take place between euro area entities, such as CSDs, agent banks and custodian banks. It will be a step in building a Europe-wide settlement system and will facilitate significant horizontal consolidation in the provision of settlement services in the EU. However, the existing CSDs that operate in the euro area (e.g., Euroclear) will continue to settle services that relate to the domestic aspects of settlement (i.e., corporate actions, asset maintenance and taxation).³⁷

7. Conclusions

Currently, twelve EU Member States collect financial transaction taxes (FTTs). Tax rates, tax bases and tax eligibility as well as collection procedures differ across countries. In most of the EU Member States, the responsibility to collect the FTT is with the parties of the trade or their agent. In two countries the responsibility to collect FTTs are the settlement service providers.

Some argue that a common FTT design would be beneficial; this would include a harmonized definition of taxable transactions (i.e., spot, forward and derivative transactions), the taxable event, the tax base and a range of tax rates, eligible taxpayers and the criteria used to determine to which financial institutions are to be mandated and instructed to collect the FTT. A common design would reduce tax-driven avoidance as well as asset and product substitution.

In principle, there are two possible procedures in following a common and comprehensive approach. The FTT could be collected through domestically based intermediaries (banks, brokers) and individual market participants (decentralized approach), backed by domestic tax collection authorities that cooperate internationally. An alternative would be centralized collection by payment and settlement institutions and stock exchanges (centralized approach). The major advantage of the centralized approach is that it avoids compliance burdens such as collecting taxes from a large number of counterparties and monitoring transaction data. Another argument was put forward by Paul Krugman (2009). He pointed out that trading activities are dispersed locally across the globe, while as a consequence of technological innovation clearing and settlement systems have undergone a centralization process that makes tax avoidance more difficult and less desirable. Collecting the tax

³⁷ Euroclear, the largest central securities depository in Europe, signed a Memorandum of Understanding with the ECB in 2009 to join Target2-Securities. Other EU CSDs, including Clearstream, have joined T2S as well.

through clearing houses or exchanges mitigates the risk of underreporting (which might occur under a decentralized approach) and reduces the scope for evasion.³⁸

This study investigates the technical feasibility of the centralized approach, in particular against the background of recent changes in clearing, settlement and payment systems. The respective infrastructures have significantly changed over the last two decades, the most striking trends being the emergence of the Continuous Linked Settlement (CLS) Bank and, most recently, the establishment of some Central Counterparty Platforms (CCPs) for OTC derivatives.

Our analysis focused, first, on *introducing an FTT under current circumstances*. The technical feasibility of centralized FTT collection is analyzed for three kinds of transactions, namely transactions on stock exchanges, over the counter transactions as well as foreign exchange transactions that are not traded on a centralized market, either.

Implementing an FTT on exchange-traded instruments seems to be straightforward and is now common practice in some EU Member States. Out of the 12 EU countries that levy an FTT,³⁹ Belgium, France, Greece, Ireland and the UK apply transaction taxes to stock exchange-based securities trading.

There are two EU Member States that impose a tax on securities transactions for which the responsibility for collection is imposed on settlement service providers: the UK, which charges the so-called Stamp Duty Reserve Tax (SDRT) on transactions in chargeable securities held in electronic form; and Ireland, which charges stamp duty on instruments that affect transfers on the sale of registered securities in Irish companies or equitable interests in Irish securities.

At present, the clearing and settlement of OTC transactions follow various avenues, which means that collecting a comprehensive FTT at the point of settlement is not (yet) feasible. Settlement services for securities that are traded bilaterally (OTC or at other trading venues, such as private markets) are provided by Central Security Deposits (CSDs), which operate securities settlement systems. Clearing functions are provided by CCPs. But if two counterparties agree to exchange a certain amount of securities for a certain amount of funds and use the same custodian bank, it happens quite often that there are no clearing or settlement agents (e.g., a CCP and/or a CSD) involved. But even if two different custodian banks are involved, the respective banks are not legally required to involve their national CSDs but may make use of their own infrastructure or may wish to use CSDs located/headquartered abroad.

Taxing financial transactions involving securities that are traded bilaterally would require mandatory settlement through CSDs. Another prerequisite would be that the end investors be

³⁸ While the operational costs of implementing centralized FTT collection are low, initial investment costs – in particular with respect to IT – do arise.

³⁹ Belgium, Finland, France, Greece, Ireland, Italy, Malta, Poland, Portugal, Hungary and the UK.

recorded in the books of the respective CSD ("direct holding system"), which is common practice in some EU countries.

The vast majority of derivatives are still traded bilaterally, with counterparties using their own internal clearing and settlement systems or making use of third-party providers. Payments with respect to derivatives contracts are settled in a number of ways (cash flow settlement): either through payment systems or through correspondent banks, with the two financial institutions handling the sorting and processing of payments themselves without involving an intermediary (ECB 2010). Where contracts are cleared by a CCP, the CCP may offer services relating to cash flow settlement. But according to the ECB, the current share of OTC trades cleared in CCPs is still low, i.e., less than 10% for CDSs. It follows that at the current juncture the comprehensive collection of an FTT on OTC transactions at the point of clearing or settlement is not feasible.

This seems to be different for foreign exchange transactions. There are numerous technical proposals for the centralized collection of a currency transaction tax (CTT). Supporters of this tax argue that CLS Bank might be used as a channel to levy the CTT. In particular, they suggest collecting the CTT at the settlement stage through the internal CLS system, when each leg of a transaction is matched on a Payment versus Payment basis. This would require that each transaction settled through CLS Bank must be identified individually at an early stage.

If CLS Bank engaged in the multilateral settlement of all foreign exchange transactions, levying a CTT at this point would be straightforward, provided each transaction is identified individually (also transactions by parties that do not hold an account with CLS Bank). Furthermore, it has to be taken into account that the implementation of a CTT may increase the incentives for banks to net obligations such as to avoid paying tax on the gross sum.

The most significant argument against levying a CTT at the point of settlement through CLS is the still existing practice of employing traditional settlement procedures, i.e., by using correspondent banking in foreign exchange transactions.

The second part of our analysis focuses on *implementation of an FTT under conditions of the future financial architecture*. The financial crisis has rephrased the debate on which institutional model of clearing and settlement systems is best in terms of efficiency, safety and soundness. While prior to the crisis, regulatory interest in centralized clearing and settlement was primarily driven by efforts to improve price transparency and decrease costs for cross-border trading, the financial crisis has put a spotlight on market failure and systemic risk, in particular in post-trading systems. The dramatic increase in derivatives trading and the difficulty in determining counterparties' exposures have prompted legislation to transfer all standardized derivatives to CCPs and to make obligatory the reporting of both standardized and non-standardized derivatives transactions to trade repositories.

It follows that legislation does not ensure an all-encompassing coverage of OTC derivatives that will have to go through central clearing. Since EU regulation does not lay down any

thresholds whose excess makes the central clearing of OTC derivatives of non-financial institutions mandatory, the prospective share, in overall OTC derivatives, of OTC derivatives that will be cleared centrally cannot be estimated.

Another question is whether reporting requirements can be utilized in some way for centralized FTT collection. If all derivatives that are cleared centrally as well as those still cleared OTC were to be reported to trade repositories, proponents argue that in the course of these reports, details of transactions could be transferred to tax revenue authorities.

But even if the legislation does not fully cover OTC derivatives that are subject to mandatory central clearing, an FTT man still be implemented by directly charging counterparties with an FTT for those transactions that are not centrally cleared. This involves a combination of a centralized and a decentralized approach in FTT administration. However, with OTC transactions not being cleared centrally, the risk of underreporting tax liabilities might be high.

With respect to the taxation of foreign exchange transactions, the current share of foreign exchange transactions settled with CLS Bank estimated of being below 70% complicates central FTT implementation. But this share might rise further, in particular against the background of increasing concerns about foreign exchange settlement risk (Committee on Payment and Settlement Systems 2008).

It follows that if a centralized approach of collecting FTTs is taken under the new financial architecture through exchanges, clearing houses and CLS Bank, this procedure has to be complemented by collecting FTTs directly from trade counterparties.

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Annex A

Procedures in a securities transaction

Once a trade has been executed at an exchange or in an OTC market, there are still a number of post-trade stages to be completed in order to achieve an effective transfer of value between counterparties (i.e., the exchange of securities for payment) (ECB 2010). There are considerable cross-country differences in the respective post-trade procedures.

The secondary market life cycle of a securities transaction involves three phases: the execution of the trade, clearing, and settlement. Thus, the process begins with the execution phase. The two parties agree to exchange a certain amount of securities for a certain amount of funds on a particular settlement date. The transaction details may be agreed directly between the two counterparties. However, transactions are normally effected by broker-dealers at an exchange or in an OTC market. The execution phase consists of three steps. In step 1, the buyer and the seller place their orders with their respective brokers and/or custodian banks. In step 2, the brokers execute their clients' orders at the respective exchange. In step 3, the exchange sends the clearing agent and the brokers details on the transactions executed. These may be sent in paper form or through electronic processing and communication systems.

Once the trade has been executed, the clearing phase starts. "Clearing" or "processing" refers to the procedures necessary in order to determine the obligations of direct market participants (broker-dealers, etc.) in terms of the delivery of securities and funds following the execution of a trade. It first involves the capture, matching, comparison and confirmation of trades. In this process, the brokers (both the buyer's and the seller's) send details of the trade to the clearing agent. The brokers send their customers a confirmation of the execution of their orders. This confirmation contains details of the trade. The clearing agent compares the two sides of the trade and sends a report to each broker and custodian. This step illustrates the central role of the clearing agent, which receives information from all the other entities (i.e., the exchange and the brokers involved) and is therefore able to compare the various transaction details. During this phase, the information flow continues until no errors are found in the details of the trade. In some cases, these processes may occur outside the clearing agent as part of the execution process. When the trades are transmitted as "locked-in" transactions by the computer systems of the exchanges or OTC markets, the details of the trades will have been matched already. Once the trade has been captured, matched, compared and confirmed, the calculation of the settlement obligations starts.

Annex B: Transaction tax procedures in EU Member States

Table 1: Transaction taxes in the EU applied to stock exchange-based securities trading, settlement and clearing

	Tax base and rate	Collection procedure
Belgium	<p><i>Transaction tax</i> of 0.17 per cent for transactions on exchange traded securities and their derivatives.</p> <p><i>Transactions tax</i> of 0.07 per cent on some OTC instruments (e.g., corporate bonds) The transaction tax is levied on secondary market transactions and a wide range of exemption do apply. There is an upper limit of the transaction (EUR 500)</p> <p><i>Stamp Duty</i> (0.15%) applies to receipts delivered in Belgium for deposit of delivery of securities.</p>	The transaction tax is collected through market participants.
France	<p><i>Stock exchange tax (l'impôt de bourse)</i> on spot and forward securities traded at exchanges or OTC: 0.3% on transaction equal or under EUR 153.000 and 0.15% on the remainder above this amount (max. EUR 610 per transaction).</p>	French brokers are required to collect and report transaction tax. This applies to the accounts of French residents, including transactions made by French residents on foreign stock exchange markets.
Greece	<p><i>Transfer tax</i> on the sale of equities transacted on the Athens stock exchange or any other stock exchange in der world (0.15% of the sale price applicable to residents and non-residents.</p>	The local brokers are collecting the tax and remit it to the local clearing and settlement system, which in turn pays the tax to the stock exchange.
Cyprus	<p><i>Stamp Duty</i> (0.15%) for transactions that take place in the Cyprus stock exchange.</p>	n.a.
Ireland	<p><i>Stamp Duty</i> (0-9%) registered in Ireland, shares and securities of foreign registered firms.</p>	CREST, the UK's real-time electronic settlement system for UK and international shares, and UK government bonds is responsible for collection, payment and reporting thereof to the Irish Revenue Commissioners.
United Kingdom	<p><i>Stamp Duty Reserve Tax (SDRT)</i> on the transfer of chargeable security (shares of UK incorporated companies, warrants to acquire shares in UK incorporated companies). The tax rate is 0.5%.</p> <p><i>Clearing System SDRT charge</i> on the issue or transfer of chargeable securities (as defined above) to a clearing system. The tax rate is 1.5%. Once in a clearing system the basic 0.5 % charge is not payable.</p> <p><i>Depository Receipt SDRT charge</i> on the issue or transfer of chargeable securities to a depository receipt issuer. The tax rate is 1.5%. Once within depository receipt form, the basic SDRT charge is not charged.</p> <p><i>Stamp Duty</i> at 0.5% on any paper document by which shares or securities are transferred. It is a charge on a document rather than on a transaction.</p>	<p>For transactions in UK securities, SDRT is generally assessed and collected by CREST, which is made responsible to report transactions and pay the collected SDRT for HM Revenue & Customs (HMRC). <i>Clearing System SDRT charge</i> is the liability of the clearing system operator unless the operator is not UK resident and the securities are transferred to its nominee – in which case the nominee is liable for the tax.</p> <p>This is the liability of the clearing system operator. CSDs are considered as "clearing services". A CSD is responsible for the collection and reporting of tax liabilities.</p> <p><i>Stamp Duty</i> can be said to be a "voluntary tax", but there are two routes by which tax collection is ensured: first a document may not be registered (or recognized by a UK Court) unless it is duly stamped (so that the share transfer will not be registered by a UK company unless someone has paid the duty), and secondly, if the stamp duty is not paid, SDRT will generally be payable under the Basic SDRT charge. Any transfer paper document will only be stamped if it has to be registered in the UK.</p>

Table 2: Transaction taxes in the EU not applied to stock exchange-based securities trading, settlement and clearing

	Tax base and rate	Collection procedure
Finland	The transferee of securities is liable to pay transfer tax, but only if the transfer is not made through the stock exchange. Some public institutions, such as the government and the Bank of Finland, are exempted from the transfer tax. The tax rate is 1.6 %. No transfer tax is due if shares of a foreign company are sold or if both the seller and the purchaser are nonresidents.	The dealer in securities is obliged to recover the tax from the transferee. Besides the transferee, the tax may also be recovered from a dealer in securities.
Italy	Stamp duty (0.14%) is imposed for domestic off-market transactions and this tax is payable by private investors, intermediaries and institutional investors alike. Transactions in domestic stock executed abroad are not subject to stamp duty. Transfers of securities through a recognized stock exchange are exempt.	Stamp duties for off-exchange transactions are collected by the brokers and paid directly to the Italian Revenue. All off exchange transactions in Italy have to be reported to the stock exchange within five minutes and the stock exchange has 60 minutes to communicate this information to the market.
Malta	"Stamp duty" (2%) is applicable on every document for the transfer of any marketable security to or from any person resident in Malta, if this transfer is executed in Malta. (except when listed on the Malta Stock Exchange)	The transfer tax is applicable only to Maltese residents and is not administered by local clearing system.
Poland	Transfer tax (1%) on shares, bonds and other securities if the underlying rights are exercised in Poland	n.a.
Portugal	-capital duty (in the form of stamp duty, 0.4%) is imposed on capital contributions to capital companies upon incorporation or any subsequent capital or equity increase. The duty is also levied on the transfer from a non-EU state to Portugal..	n.a.
Hungary	Transfer tax (4%) on the acquisition of shares in real estate holding companies (from 1 January 2010), provided that as a result of the acquisition the ownership of the transferee reaches or exceeds 75% of all outstanding shares.	n.a.

Table 3: Transaction taxes outside the EU applied to stock exchange-based securities

	Tax base and rate	Collection procedure
Switzerland	The issue of shares of a Swiss corporation is usually subject to a 1% securities issue tax (there are exemptions, in particular for merger and merger-like transactions). If a Swiss-registered securities dealer is either party or intermediary to a sale of securities, usually a 0.15% (domestic securities) or 0.3% (foreign securities) stamp transfer tax is levied. However, there are an increasing number of exemptions from stamp transfer tax for certain types of transactions and counterparties (foreign financial institutions and stock-listed foreign corporations).	Stamp transfer tax is collected through broker dealers, banks and corporations.

Source: The Fiscal Compliance Experts' Group (2006).