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T2S ECONOMIC IMPACT ANALYSIS

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EXECUTIVE SUMMARY

On 18 December 2007, the ECB published the TARGET2-Securities (T2S) User Requirements Document for public consultation. In parallel, the ECB published a note setting out the proposed methodology for the Economic Impact Analysis (EIA) of T2S.

The public consultation ended on 2 April 2008. However, the ECB had a number of discussions with market participants at Advisory Group meetings, dedicated information sessions and in bilateral talks, and so could already anticipate certain comments. In this context, and given the very tight deadlines for finalising the EIA, the ECB asked all European CSDs and a sample of potential T2S Users in an ECB survey for their data input on 18 March 2008. Potential T2S Users approached for their data input include a sample of large custodian and investor banks, as well as CCPs. A sample of smaller market participants were approached by the national central banks. Responses to the questionnaires were expected by 15 April 2008.

The main refinements of the methodology that is the basis for the ECB survey involve a simplification of the data input needed from market participants and the inclusion of a profit margin for CSDs. Furthermore, some assumptions in the baseline scenario have been clarified in a way that further minimises the estimated benefits from T2S. The average cost per settlement instruction is calculated such that the net present value of the cash flows in the development and operating phase equals zero in order to reflect the full cost recovery principle. Finally, two additional scenarios on minimum reshaping and a broader geographical scope are included.

The methodology for analysing the economic impact of T2S presented in this note proposes two indicators for evaluating the potential benefits of T2S for market participants and the European economy. The first indicator is the total average fee per settlement instruction. The aim of this indicator is to focus on a direct comparison between the cost per settlement instruction with T2S and the current market structure without T2S.

The second indicator consists of an impact analysis assessing the costs and benefits of T2S for its stakeholders and the social welfare implications of T2S in general. As reality is inevitably more complex than any one single methodology can address, this indicator includes several quantitative approaches. The different results will be compared, put into relation and checked for coherence. A conclusion will be drawn as to the impact on market participants and social welfare that could be expected as result of the implementation of T2S.

INTRODUCTION

On 8 March 2007, the Governing Council of the European Central Bank (ECB) concluded that it is feasible to implement TARGET2-Securities (T2S) and therefore decided to go ahead with the next phase of the project, namely the definition of user requirements based on market contributions. As part of this phase of the project, the T2S Project Team at the ECB prepared a methodology for the economic impact analysis to update the initial T2S Economic Feasibility Study from March 2007¹.

Following an initial review by the T2S Advisory Group (AG, created by the Governing Council on 26 April 2007) and by the Eurosystem's Payment and Securities Settlement Committee (PSSC), both of which considered it opportune to release the methodology to the general public for consultation in parallel to the T2S User Requirements Document (URD), the Governing Council published both documents on 18 December 2007. It invited market participants to comment on both documents by 2 April 2008 at the latest².

The public consultation ended on 2 April 2008. However, a number of discussions with market participants during AG meetings and in bilateral talks allowed the ECB to anticipate certain comments. In this context, and given the very tight deadlines for finalising the Economic Impact Assessment (EIA), the ECB asked all European CSDs and a sample of potential T2S Users in an ECB survey to give their data input at this stage. Potential T2S Users approached for their data input include a sample of large custodian and investor banks, as well as CCPs. A sample of smaller market participants were approached by the national central banks.

The purpose of this note is to define two indicators for evaluating the benefits of T2S, including the comments received during the public consultation:

- 1) the average fee per settlement instruction (chapter 2); and
- 2) the impact analysis assessing T2S's cost-benefit and social welfare impact (chapter 3).

In particular, this document defines in formulae (but not yet in figures) the cost to the Eurosystem of introducing T2S and the additional costs/savings for central securities depositories (CSDs) and for T2S Users³ resulting from the introduction of T2S. It also states the main assumptions and scenarios of the T2S EIA included in the EIA questionnaires on which market participants based their assessments and formulated their responses.

¹ European Central Bank, TARGET2-Securities – Economic Feasibility Study, March 2007.

² European Central Bank, TARGET2-Securities – Economic Impact Analysis, December 2007 and European Central Bank, TARGET2-Securities – User Requirements, December 2007.

³ T2S Users include mainly banks (custodian banks, investment banks, etc.), but also central counterparties (CCPs), for example.

1. EIA ASSUMPTIONS AND SCENARIOS

The aggregation of data calculated at the level of individual market participants requires clearly specified common assumptions for consistency. To allow the analysis of different hypotheses, the EIA defines scenarios which were assessed by the market participants in their responses to the questionnaires.

The T2S EIA employs the following assumptions in its baseline scenario (**scenario 1**):

- the user requirements of T2S as published in December 2007 form the functional base and framework for the T2S EIA;
- all settlement instructions in central bank money in euro in the euro area CSDs are processed in T2S;
- all data requested (fees, traffic, etc.) in the questionnaire relate to 2007 to avoid making controversial assumptions about future fees and traffic. The EIA methodology then applies a common conservative growth factor of 6% per annum to the traffic figures to arrive at estimated 2013 traffic;
- complete adjustment to T2S: CSDs stop investing in the settlement function as soon as the Governing Council decides to implement T2S (assumption: July 2008), or invest only in relatively small projects which can be recovered before T2S opens (assumption: July 2013). Moreover, they “reshape” their infrastructure completely as soon as T2S opens, adapt to the maximum to T2S, closing all parts which are no longer needed with T2S. In particular, the CSDs do not replicate any T2S processes or data in their systems. They do not maintain national specificities and they do not offer matching facilities;
- CSDs offer both direct and indirect connectivity;
- market participants continue with their present business relationships in 2007 and do not take into account new opportunities offered by T2S. For example, it is assumed that no new link is opened between CSDs and that no customer decides to by-pass its present direct custodian (if any). Although it is expected that T2S will provide incentives to establish new business relationships, they are not taken into account in the baseline scenario;
- similarly, the only harmonisation benefits taken into account in the EIA are based directly on the User Requirements (collateral and back-office benefits). However, it is clear that T2S provides a strong incentive for further harmonisation in other fields, in particular in corporate events. It is very difficult to assess benefits beyond the current version of the user requirements and to estimate the share of the benefits relating to T2S. Therefore, these are not counted in this – conservative – approach.

The additional scenarios each alter one or two aspects of the baseline scenario while maintaining all other baseline assumptions (*ceteris paribus* approach). It is important to note that the various options, which are considered in the EIA do not prejudice decisions of the Governing Council.

In **scenario 2**, T2S also settles in other European Union currencies with a focus on four markets (CHF, DKK, GBP, SEK).

Scenario 3 assumes that CSDs do not completely adjust to T2S but rather keep their current investment schedule, or follow a similar pattern as in the previous years. Moreover, they “reshape” to the minimum extent to T2S, keeping their internal processes as much as possible and therefore replicate T2S data in

their systems.

Scenario 4 considers the impact of only a partial transfer of current European settlement volume to T2S, i.e. only 50% of current volume.

Scenario 5 looks at the sensitivity of the calculations to different capital costs.

The static approach followed in the EIA tends to minimise the benefits of T2S (market participants engage in new activities only if they anticipate a benefit, harmonisation takes place only if it creates value for the market). The assumptions underlying the EIA imply that many users will not provide positive answers to the survey because their benefits are either counted at the level of their custodians, or are minimised in the study in order to keep the survey as simple as possible. Therefore, the responses of market participants to the questionnaires can be aggregated into a very conservative estimate of the static net impact of T2S on the end-user of T2S, without double-counting any benefits. This approach is therefore consistent with the aim of evaluating the **minimum** benefits of T2S. Moreover, the questionnaires open the possibility for market participants to indicate the importance of the new business opportunities that they envisage. These figures will be used with caution, as new business opportunities depend on the behaviour of other actors. This raises serious methodological problems which are acknowledged and taken into account.

2. AVERAGE FEE PER SETTLEMENT INSTRUCTION

This chapter sets out a methodology to calculate the average fee per settlement instruction, which equals the average cost per settlement instruction plus a profit margin for CSDs. The total cost of settlement instructions that will be ultimately recovered by the CSDs includes the T2S costs and additional costs incurred by the CSDs. In order to facilitate a comparison with current settlement solutions, the methodology converts these costs into an average cost per settlement instruction (AvC_{total}), equal to the sum of the average T2S costs per settlement instruction (AvC_{T2S}) plus the additional average costs incurred by the CSDs per settlement instruction (AvC_{CSD}):

$$AvC_{total} = AvC_{T2S} + AvC_{CSD} \quad (1)$$

Section 2.1 discusses the calculation of the number of settlement instructions, section 2.2 defines the formula for estimating AvC_{T2S} from a net present value perspective and section 2.3 describes the methodology for estimating AvC_{CSD} from a net present value perspective. Section 2.4 summarises the average cost per settlement instruction and turns the average cost into an average fee by including a profit margin for CSDs.

2.1 Estimated volume of settlement instructions

One purpose of the analysis is to provide a direct comparison between the cost per settlement instruction with T2S and the current market structure without T2S. The calculation uses the number of instructions reported by CSDs for 2007. From 2001 to 2007, the volume growth in securities settlement has exceeded

12 % per year⁴. During the estimated development phase of the project from 2007 to 2013, it is conservatively assumed that volume growth will not exceed 6% per year.

For the operational phase of T2S (2013-2019), the market may evolve and volumes may increase (e.g. more trading activity) or decrease (e.g. an increase in internalisation of settlement at the level of custodian banks). Such evolutions would affect the market independently of the introduction of T2S and do not affect the business case for T2S as they do not affect the relative prices for settlement with/without T2S. The T2S EIA does not aim at anticipating the fees that T2S will charge the CSDs in the future.

T2S will settle instructions generated from trading, transfers and collateral activities. Some markets do not represent volumes as settlement instructions, but as settlement transactions. The latter term refers to the simultaneous exchange of assets between deliverers and receivers, while the former term refers to the settlement of the unilateral instruction sent by one of the parties. Determining the number of settlement instructions requires multiplying the number of settlement transactions by two.

In addition, T2S will receive settlement instructions resulting from corporate events (e.g. spin-offs, stock splits and conversions). The underlying assumption is that this number is negligible except for the direct holding markets.

The analysis is conducted as if T2S had started to operate in 2007. This means that the net present value is calculated as if investments had occurred from 2001 to 2006 and the costs for these investments had to be recovered from 2007 to 2012. Therefore, the calculations are based on the volumes reported by the CSDs for 2007 in the survey and estimated for the years until 2012.

One objective of T2S is to create a platform open to all users in the euro area (and beyond) that opt for it. The assumption in the baseline scenario of this study is that all CSDs settling in central bank money in euro in the euro area will have an interest in participating in T2S and, therefore, the aggregated volume of all CSDs settling in central bank money in euro in the euro area is the underlying figure for the analysis. However, it might be that T2S will not reach a market share of 100% for several reasons. For example, some CSDs in the euro area may decide not to participate⁵. Therefore, the study provides a sensitivity analysis with calculations of AvC_{total} for a different volume scenario 4 (50% market share)⁶. This sensitivity analysis is addressed in scenario 4. It also reflects the possibility of increased internalisation and thus lower volume relative to today, but it neglects the possibility of volume increases from increased trading activity.

⁴ Based on ECB Blue Book and ECB survey data.

⁵ In case a CSD decides not to participate, the loss of customers for T2S will probably be lower than the market share of this CSD because the customers of that CSD may decide to participate in T2S anyway, using other channels.

⁶ Note that different volumes may not only affect the number of settlement instructions, but also the T2S costs and the additional CSD costs (for example, lower volume would require less IT capacity). Therefore, T2S operating costs (hardware and software) and the cost of communication between T2S and CSDs are reduced by 25% in scenario 4.

T2S will provide the possibility of settling non-euro transactions if non-euro markets have a business interest in doing so and if the relevant central bank accepts to outsource its cash accounts⁷. In scenario 2, T2S also settles in other currencies of the European Union, with a focus on four markets (CHF, DKK, GBP, SEK).

2.2 T2S costs

This section applies a top-down approach to describing the cost items that determine the Eurosystem’s total T2S costs. The four national central banks (3CBplus) that will develop the system will provide the initial estimates of the figures for their respective items and the T2S Project Team will provide estimates for any additional resources.

2.2.1 Project duration and amortisation period

The TARGET and TARGET2 projects both took approximately five years to deliver and provide a basis for comparison in estimating the duration of the T2S project. Delivery of T2S is expected to take six years due to its additional technical complexity and more demanding consultation process (given the higher number of entities involved in its governance). The amortisation period for T2S and other investment costs is also set at six years⁸, which is comparable to the period used for TARGET2. This results in a reference period for the development phase of July 2007 to July 2013; and for the maintenance and running phase of July 2013 to July 2019.

2.2.2 T2S investment and running costs

The methodology will treat T2S as an asset provided by the Eurosystem, which will provide cost estimates based on the URD. For the purpose of this analysis, it is assumed that T2S is not subject to any taxes (VAT etc.). In line with market practise, the study excludes Eurosystem external costs for the governance of the T2S project. Eurosystem internal costs for governance are included, however.

T2S investment costs

The costs of implementing T2S are the cost of developing T2S by the Eurosystem. Table 1 below provides an overview of the costs to be included in the total investment:

Table 1: Overview of T2S investment costs during the development phase

Personnel costs	Other direct related costs and allocated costs	Overhead	Dedicated project investments
Staff cost including consultants	Allocated costs for use of common/dedicated infrastructure (offices, IT, telecoms, etc.), business travel and other direct costs	Legal, technical and analytical documentation and other overheads	Hardware and Software investment, including all costs necessary for back-up and recovery functions

⁷ The participation of a market in T2S does not require that the respective national central bank participates in TARGET2. It is only necessary that the respective national central bank opens accounts for its market participants in T2S.
⁸ European Commission, Guide to Cost-Benefit Analysis of Investment Projects, DG Regional Policy, 2002.

The sum of the cost items listed in Table 1 documents the T2S investment costs as cash flows for the respective year.

T2S Operation / Running Costs

The recurring annual costs to operate and maintain T2S consist of fixed costs and variable costs, where the latter depend on the volume of settlement instructions in T2S. The annual running costs for T2S during the maintenance and running phase are summarised in Table 3:

Table 2: Overview of T2S operating / running costs during the maintenance and running phase

Personnel costs	Other direct related costs and allocated costs	Overhead	Maintenance of project investments
Staff cost including consultants	Cost of IT operations and business operations (see text for details)	Other overheads	Maintenance of hardware and software investment, i.e. expenses for corrective measures, upgrading supported functions, etc.

Personnel costs include costs for account managers and business experts. To the extent that they are not already included in personnel costs, the cost of IT operations includes:

- a) running costs according to Service Level Agreements with Eurosystem;
- b) Eurosystem Technical Help Desk (at least for CSDs);
- c) connectivity / communication (All messages between T2S and CSDs that are part of the integrated settlement process will be included⁹. Messages between the directly connected T2S Users and T2S, as well as messages between indirectly connected T2S Users and their respective CSD, are considered not substantially different with or without T2S. It is assumed that T2S brings no benefit or cost in this field¹⁰).

The cost of business operations includes:

- a) allocated costs for infrastructure (offices, IT, telecom, etc.);
- b) other direct costs (travel expenses, etc.).

In addition, the Eurosystem cost estimate includes a buffer for project risk, but the development of additional functionalities in the future is not included in the maintenance of project investments since these are not foreseeable today.

Operating costs are calculated for the first year of the operational phase, and personnel and running costs are assumed to grow by 2% over the operational phase of T2S.

⁹ These may not be very volume sensitive since they will be likely to be carried via dedicated channels.
¹⁰ Communication costs for payment transactions via SWIFT seem to have been affected by the introduction of TARGET2 in some markets. However, there has not yet been a decision on the network service provider for T2S and this information will be taken into account appropriately.

2.2.3 Average T2S cost per settlement instruction

The full cost recovery principle of T2S requires that the revenues generated in the operation phase cover both the investment costs and the running costs of T2S. This methodology assumes that all T2S revenues are derived from settlement instructions only. The average T2S cost per settlement instruction is calculated in the same way as in the T2S Economic Feasibility Study¹¹: the net present value of the cash flows in the development and operating phase equals zero in order to reflect the full cost recovery principle. This calculation is made as if T2S had started to operate in 2007 and it implies that the average T2S cost is equal to the average fee that T2S would charge the CSDs under the market structure in 2007.

This analysis assumes an annual cost of capital of 6% for all T2S investment costs¹². The study will provide a sensitivity analysis of the results with respect to different values for the cost of capital. All investment costs are multiplied by the appropriate capital cost factor¹³, and all revenues are discounted into the base year 2007.

The template presented in Table 3 illustrates the total cost of investment. The study will use figures for each box labelled with an 'x'.

Table 3: Template for the cash flows of T2S costs

period	Development phase of T2S						Operating phase of T2S						
	1	2	3	4	5	6	1	2	3	4	5	6	
reflects year ... for actual cash flows	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	
reflects year ... for settlement volume	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	
number of settlement instructions							x	x	x	x	x	x	
cost/fee per instruction							x	x	x	x	x	x	
revenue							x	x	x	x	x	x	
T2S investment costs	x	x	x	x	x	x							
T2S running costs							x	x	x	x	x	x	
cash flow	0	0	0	0	0	0	0	0	0	0	0	0	
discount factor	1.418519	1.338226	1.262477	1.191016	1.1236	1.06	1	0.943396	0.889996	0.839619	0.792094	0.747258	sum
discounted cash flow	0	0	0	0	0	0	0	0	0	0	0	0	0

2.2.4 T2S costs in scenario 2

So far, all costs for T2S have been calculated under the baseline scenario 1. This means in particular that the geographic scope of T2S is limited to euro area countries. In scenario 2, T2S also settles in other currencies of the European Union, with a focus on four markets (CHF, DKK, GBP, SEK). The considerably higher settlement volumes in scenario 2 will result in higher operational costs. The T2S Advisory Group considered it appropriate to augment the T2S operating costs (hardware and software) and the cost for communication between T2S and CSDs by 40% for scenario 2.

¹¹ European Central Bank, TARGET2-Securities – Economic Feasibility Study, March 2007.

¹² European Commission, Guide to Cost-Benefit Analysis of Investment Projects, DG Regional Policy, 2002. The T2S AG agreed that a capital cost of 6% might be a good average of the Eurosystem capital cost and the CSDs' capital costs, if the methodology also includes a sensitivity analysis.

¹³ For example, an investment that will take place in 2009, i.e. four years prior to the expected start of operation in 2013, is multiplied with $(1.06)^4=1.262$.

2.3 Additional CSD costs

In analogy with the T2S costs in the previous section, the analysis follows a top-down approach to tabulate the costs to CSDs that they have to recover from their Users for settlement in addition to the direct T2S costs. Chapter 1 of this note contains the basic assumptions for the cost calculations.

2.3.1 Additional CSD investment and running costs

This analysis does not take into account the costs or the benefits from further harmonisation that go beyond the level achieved in the URD. It focuses solely on T2S and the components needed to make the system operational.

Additional CSD investment costs

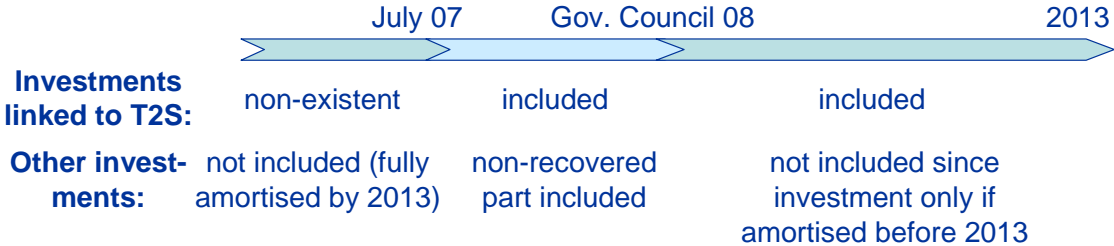
The additional investment costs for CSDs are composed of two elements: settlement related investment costs for a complete reshaping with T2S, and non-recovered past investments.

The assumption in the baseline scenario of a complete reshaping to T2S implies that CSDs:

- limit new investments to what is absolutely necessary after July 2008;
- do not have to maintain any process to meet a national specificity in the T2S environment;
- do not maintain an additional settlement facility within the CSD;
- provide connectivity/validation facilities for indirect users;
- make, after July 2008, investments for settlement only if they are absolutely needed and can be amortised before T2S opens, i.e. these investments are not included in the costs of adjusting to T2S¹⁴;
- do not replicate T2S processes and data at CSD level;
- do not provide matching facilities, as the costs for matching are already included in the T2S costs (AvC_{T2S}).

In case these investments are to serve several types of transactions (e.g. commercial bank money or non-euro currencies) or services (e.g. asset servicing, custody), they will be pro-rated based, for example, on transaction volumes. Figure 1 summarises the treatment of CSD investment costs.

Figure 1: Treatment of CSD investment costs



¹⁴ Since the analysis assumes a six-year amortisation period for investments and a system opening date five years after the expected final Governing Council decision in July 2008, all investment costs spent before July 2007 are deemed recoverable before the system opens and are not counted. The only past investments to be considered are the non-recovered part, i.e. one sixth, of the investment costs accrued between July 2007 and July 2008.

Additional CSD running / operating costs

CSD running costs after a complete reshaping may include:

- costs for monitoring settlement in T2S;
- regular maintenance of the investment costs, excluding the development of new functionalities;
- CSD helpdesk functions for their customers (evaluated in man-hours per week and euros per year, including pro-rated overhead costs).

The details of the separation of tasks between the CSD helpdesks and the T2S helpdesk will be decided in the future. For the purpose of this analysis, it is assumed that the helpdesk remains the responsibility of CSDs. CSDs need to ensure in their cost estimates that they include only the helpdesk costs that are attributable to core settlement services and exclude the costs associated with other services (corporate actions, etc.).

The CSD running costs exclude in particular:

- all future direct T2S fees paid to the Eurosystem;
- any costs associated with non-core settlement services such as the management of corporate actions.

2.3.2 Minimum reshaping scenario (scenario 3)

In the previous sections, CSD investment and running costs were calculated for the baseline scenario and scenario 2.

In addition, scenario 3 assumes that CSDs do not completely adjust to T2S but rather “reshape” to the minimum extent to T2S. This means that CSDs:

- maintain current national specificities;
- continue with their investment schedule as planned. In view of the opening of T2S, CSDs minimise their T2S-investment to connecting their internal IT applications to T2S;
- all T2S processes and data are replicated in CSDs’ IT systems.

All other assumptions remaining equal, both CSD investment and running costs can be calculated the same way as described in sections 2.3.2 and 2.3.3, respectively.

2.3.3 Average additional CSD cost per settlement instruction

To provide a figure that is comparable to the T2S average cost per settlement instruction AvC_{T2S} , the methodology applies the same calculation in order to convert the CSD cash flows into an average CSD cost per settlement instruction (AvC_{CSD}): the net present value of the cash flows in the development and operating phase equals zero in order to reflect the full cost recovery principle. This calculation is made as if T2S had started to operate in 2007.

As for T2S, this methodology assumes an annual cost of capital of 6% for all additional CSD investment costs. All investment costs are multiplied by the appropriate capital cost factor, and all revenues are

discounted into the base year 2007.

The template presented in Table 4 illustrates the total cost of investment. The study will use figures for each box labelled with an 'x'.

Table 4: Template for the cash flows of additional CSD investment costs

period	Development phase of T2S						Operating phase of T2S						
	1	2	3	4	5	6	1	2	3	4	5	6	
reflects year ... for actual cash flows	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	
reflects year ... for settlement volume	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	
number of settlement instructions							x	x	x	x	x	x	
cost per instruction							x	x	x	x	x	x	
revenue							x	x	x	x	x	x	
CSD investment costs	x	x	x	x	x	x							
CSD running costs							x	x	x	x	x	x	
cash flow	0	0	0	0	0	0	0	0	0	0	0	0	
discount factor	1.418519	1.338226	1.262477	1.191016	1.1236	1.06	1	0.943396	0.889996	0.839619	0.792094	0.747258	sum
discounted cash flow	0	0	0	0	0	0	0	0	0	0	0	0	0

The running costs and possibly the investment costs of CSDs may differ for directly and indirectly connected T2S Users. Competition between CSDs will ensure that T2S Users will only have to bear the costs for services they actually use.

2.4 Total average cost and total average fee per settlement instruction

The total average cost per settlement instruction (AvC_{total}) that CSDs will ultimately recover has two components. The first component is the average T2S cost per settlement instruction (AvC_{T2S}), and the second component is the additional average cost incurred by the CSDs (AvC_{CSD}).

$$AvC_{total} = AvC_{T2S,2007} + AvC_{CSD,2007} \cdot \quad (8)$$

These total costs cover the entire settlement process (Delivery-versus-Payment (DvP) and Free-of-Payment (FoP)), including cost for matching, queries, reporting, account administration and cash settlement in the case of DvP transactions.

Since T2S will be operated under the principle of full cost recovery, the average T2S cost per settlement instruction (AvC_{T2S}) is equal to the average T2S fee per settlement instruction under the market structure in 2007. Since the investment costs include a cost of capital, the additional average costs incurred by the CSDs (AvC_{CSD}) would be equal to the total average fee that would be paid by the T2S Users in addition to AvC_{T2S} under perfect competition.

However, CSDs include a profit margin in their current fees and will probably continue to do so with T2S. Therefore, the total average fee per settlement instruction with T2S under the market structure in 2007 (AvF_{total}) also includes a profit margin for CSDs.

$$AvF_{total} = AvC_{T2S,2007} + AvC_{CSD,2007} \cdot (\text{CSD profit margin}) \quad (9)$$

It is important to note that the pricing of settlement services is not the objective of the EIA. The EIA estimates the potential benefits to market participants and the European economy. The actual fee

schedule, i.e. the pricing, of T2S will be discussed at a later stage.

In the EIA, it is assumed that all income for T2S comes from settlement (DvP and FoP). This is another reason why AvF_{total} should not be confused with current fees per settlement instruction. Today, CSDs have very heterogeneous pricing structures: they generate revenue from settlement instructions, for example, but also from extra fees for matching, queries, reporting, account administration and cash settlement of DvP transactions. The methodology for the quantitative T2S impact analysis in section 3.1.5 takes this into account.

3. IMPACT ANALYSIS

Different methodologies have measured the impact on market participants and social welfare of integrating the European post-trading market infrastructure¹⁵. These methodologies differ both in the set of underlying assumptions and in the scope of the securities, geographical markets and parts of the value chain covered. This chapter reflects the consensus of the T2S Advisory Group that the cost-benefit and social welfare analysis should include several quantitative approaches, since reality is inevitably more complex than what can currently be addressed with any one single methodology. The different results will be compared, put into relation and checked for coherence. A conclusion will be provided on the expected impact of the implementation of T2S on market participants and social welfare.

Section 2.1 describes a disaggregated approach that aims at looking at the costs and benefits for each market participant/stakeholder separately. Section 2.2 uses two existing studies to extrapolate the cost impact of T2S. All these quantitative methodologies focus on cost savings. T2S, however, will not only bring cost savings, but will also offer a number of new opportunities to market participants. Since these are very difficult to quantify, section 2.3 first details the non-quantifiable benefits of T2S. The second section refers to a methodology developed by the European Commission to estimate the total benefits of the system. While this methodology may be less precise, it in principle includes certain dynamic welfare effects of T2S missing in the other estimates.

3.1 Cost-benefit analysis

One approach to calculating the overall impact of T2S on the economy is to look at the costs and benefits for each market participant/stakeholder separately and sum the net impacts. These stakeholders include the Eurosystem, CSDs, T2S Users (various types of intermediaries), issuers and investors.

This section consists of a qualitative evaluation of the impact on the different stakeholders. In addition, the last subsection provides the methodology for a quantitative end-to-end assessment of the net benefits of T2S.

¹⁵ See e.g. European Commission, Draft Working Document on Post-Trading Activities, May 2006, and the references in Annex I therein.

3.1.1 Impact on the Eurosystem

As the Eurosystem will operate T2S on a cost-recovery basis, the direct impact for the Eurosystem will be neutral. There are, however, a number of indirect benefits. These include:

- an increase in back-office efficiency, as the management of Eurosystem credit operations collateral will be facilitated by simpler interactions with the market infrastructure (e.g. single settlement interface);
- better accessibility to cross-border collateral; and
- reduced systemic risk, owing to extended use of Real-Time Gross Settlement for DvP transactions¹⁶.

The EIA does not quantitatively consider these aspects. Nevertheless, they increase the desirability of the project.

However, on the negative side, this project involves non-quantifiable risks for the Eurosystem. These include the financial risk that the Eurosystem is taking in its commitment to cost-recovery and the associated pre-financing of the development of T2S, and the potential risk to reputation, e.g. in the case of a substantial delay of the project or a major operational problem in production.

Furthermore, some of the cash transactions, currently processed on TARGET2, may move to T2S. The T2S Project Team does not expect a significant negative volume impact on TARGET2, as only a few markets settle all transactions individually on T2. Even systems using the interfaced model with TARGET2 use techniques (such as netting or the guarantee model) which reduce the number of transactions settled in T2. Therefore, the size of volumes that could move to T2S relative to the total volume of TARGET2 can be considered minimal.

Overall, and in the absence of a quantification of the benefits and risks, this analysis assumes that T2S is neutral for the Eurosystem.

3.1.2 Impact on CSDs

T2S offers CSDs the possibility to reshape their existing settlement infrastructure and thus to optimally adapt to T2S. This reshaping is associated with investment costs and some remaining settlement running costs that will occur in addition to the T2S fees charged by the Eurosystem to the CSDs (see section 2.3).

CSDs will be able to recover these costs (including their profit margin) from their Users. At the same time, the reshaping will allow CSDs to save costs relative to their current investment and running costs. The net impact of T2S on CSDs depends on the balance between the costs and profits with T2S and their current costs and profits without T2S.

¹⁶ The reduction in systemic risk might be associated with a minor increase in liquidity costs for market participants. In general, the market appears to prefer real-time gross settlement over any of the alternatives.

In addition, CSDs will profit from T2S by engaging in new businesses. One part of these new opportunities will be new business concepts facilitated by T2S, thus creating benefits on an aggregated level. Another part of the benefits for some CSDs will be losses for other market participants, which represents a pure redistribution effect that does not create benefits in the aggregate. The aggregation of any new business opportunity into the overall T2S EIA has to carefully consider bias and expectations of the market participants with regard to new business opportunities.

3.1.3 Impact on T2S Users

T2S Users will benefit in a number of ways from T2S. The main net benefits for intermediaries occur in four categories:

- 1) transaction cost savings – the difference between the average fee charged by settlement service providers (CSDs or custodian banks) for core settlement services today and the total average fee per settlement instruction with T2S (AvF_{total}), as calculated in chapter 2 of this note;
- 2) collateral savings – T2S will overcome market fragmentation and create a single pool of assets, and T2S Users will be able to centralise liquidity in a single central bank cash account for a harmonised settlement process. These features will help T2S Users in manage collateral, optimise their funding costs and avoid failed deliveries. These savings will be complemented by savings from two other Eurosystem market infrastructure projects, TARGET2 and Collateral Central Bank Management (CCBM2). The annex provides an overview of the collateral savings that are triggered by T2S and the complementarities to TARGET2 and CCBM2. The EIA includes only collateral savings attributable to T2S;
- 3) net back-office savings – in a single process for settlement, intermediaries will no longer need to maintain many different settlement interfaces with several CSDs and/or other intermediaries for settlement purposes;
- 4) other net benefits – e.g. further harmonisation and new business opportunities.

The EIA focuses on an end-to-end perspective for quantifying the net benefits from T2S. Therefore, the quantitative impact analysis in subsection 3.1.5 closely follows these categories.

3.1.4 Impact on other stakeholders

The methodology only quantifies the costs and benefits at the level of CSDs and T2S Users for practical reasons (as set out in the next subsection). Therefore, it follows that the disaggregated approach understates the benefits of T2S for society because it compiles only the measurable and identifiable figures. This approach does not consider the quantitative impacts on other stakeholders, such as issuers and investors, and the indirect (dynamic) effects (but these are part of the social welfare analysis).

In terms of qualitative analysis, the enlarged market will be the primary benefit of T2S for issuers. T2S creates the possibility to turn current domestic issuance into euro area issuance at potentially no additional cost, while remaining under local legal and tax regimes.

For pan-European issues, T2S will greatly facilitate the settlement of the primary market, which essentially will become domestic in T2S. T2S will increase the attractiveness of local debt instruments, as more investors will be able to access them easily at a reduced cost. In particular, their use in general collateral operations could create better pricing.

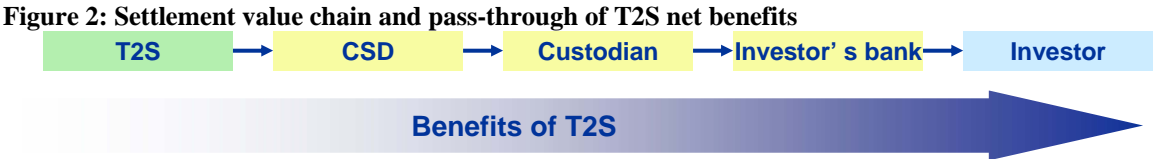
Over time, this may contribute to a reduction of the current valuation gap between securities in the US dollar and the euro markets. The dynamic aggregate analysis, proposed in section 3.3, provides a methodology to quantify these effects.

The benefits from T2S will differ in scale among the categories of investors. T2S will primarily facilitate easier access to non-local securities for retail investors, an under-developed market segment today owing to the prohibitive cost and high complexity of cross-border settlement, which may be one explanation for the observed home bias of retail investors. Economic theory suggests gains from portfolio diversification. However, the impact from cheaper domestic settlement might be small (but worthwhile), as the cost of settlement infrastructure is a small component of the cost of a retail transaction.

T2S generates benefits to institutional investors for both domestic and non-local securities. As for retail, it is assumed that net savings at the settlement infrastructure level will be passed on to the final investor, given a sufficient degree of competition at all levels.

3.1.5 Quantitative impact analysis – ECB survey

During several meetings, the Advisory Group has asked to focus on an end-to-end perspective in the EIA. Figure 2 depicts the way the net benefits, i.e. the difference between benefits and costs, of T2S will agglomerate and pass through the settlement value chain to investors.



It is expected that due to competitive pressure, cost savings originating at the CSD and the custodian level¹⁷ will be passed through to the investor's banks, which include broker/dealers, and the investor level. This assumption can be justified with some basic economic principles: profit margins depend inversely on the elasticity of demand with respect to the services offered.

Furthermore, it is expected that T2S will increase competition, resulting in an increase in the elasticity of demand for services of individual organisations. This will force market participants not only to pass on

¹⁷ Based on the assumption that Eurobonds will continue to be settled in commercial bank money, ICSDs are considered as custodians in the EIA.

their cost savings to their customers, but increase the pressure on their profit margins.

The methodology quantifies the impact of T2S in five categories (both in the baseline scenario and in scenario 2): savings on settlement fees, back-office adjustment and running costs, liquidity and collateral, as well as other net benefits.

1) Savings on settlement fees at the CSD and custodian level

From an end-to-end perspective, savings on settlement fees will accrue at the CSD and custodian level. CSD fee savings can be calculated as the difference between CSD fees without T2S and the total average fee per settlement instruction with T2S under the assumption that T2S had been operating in 2007 (AvF_{total}), multiplied by the number of settlement instructions in 2007 and the estimated traffic for the period 2008-2013 (see section 2.1).

As part of the questionnaires, CSDs have provided the total amount of settlement fees¹⁸ they received during 2007, after deducting settlement-related rebates granted to customers.

It is necessary to treat connectivity / communication costs consistently across the scenarios with and without T2S. Without T2S, the connection between the settlement engine and other CSD infrastructure is internal to the CSD, and any inherent communication costs are thus part of the current CSD fees. T2S will require a connection between T2S and the CSD's remaining infrastructure. The costs of this connection are included in the Eurosystem cost estimate for the EIA and thus part of AvF_{total} (see also section 2.2.4).

The communication costs to Users for their connection to the CSDs (or the settlement platform in case of direct connectivity to T2S) are considered not substantially different with or without T2S. It is assumed that T2S brings no benefit or additional cost in this field¹⁹.

At the level of custodian banks, the evaluation of savings on settlement fees is more complex, as different settlement options for Users with and without T2S need to be assessed.

¹⁸ Settlement fees include fees for all core settlement services that will be covered by T2S according to the current version of the URD. Please include all variable (volume-dependent) fees and the pro-rated part of fixed (volume-independent) fees that can be attributed to settlement.

¹⁹ Communication costs for payment transactions via SWIFT seem to have been affected by the introduction of TARGET2 in some markets. However, there has not yet been a decision on the network service provider for T2S, and this information will be taken into account appropriately.

Figure 3: Settlement options for Users and associated benefits in settlement fees with T2S

Choice of settlement agent (Investor settles via...)		Benefits in settlement fees, excluding other benefits	
	Without T2S	With T2S	
Case 1	CSD	CSD	Savings on CSD fees
Case 2	Custodian	Custodian	Savings on CSD fees and reduction of custodian fees
Case 3	Custodian	CSD	Savings on CSD fees plus elimination of custodian fees

In case 2, custodians’ costs will be reduced because custodians will save on

- CSD fees,
- collateral costs and;
- back office costs.

It is assumed that competitive pressures will force Custodians to pass these benefits to investors’ banks, broker/dealers and investors.

In case 3, investor banks and broker-dealers will switch from Custodian services to directly using CSD services. To avoid complex methodological problems, this possibility is not considered in the baseline scenario, although some market participants perceive this as one of the main benefits. Custodians’ customers will make this change only if they have a financial interest. Therefore, excluding this possibility in the EIA understates the benefits which can be expected from T2S. This assumption conforms with the static approach of the EIA and with its conservative approach to evaluating the benefits of T2S.

In summary, the EIA does not explicitly evaluate savings on custodian fees to avoid double counting and to keep the survey as simple as possible. Given this approach, some users will not have provided positive answers to the survey, as their benefits are either counted at the level of their custodians, or are minimised in order to keep the survey as simple as possible.

2) Cost of adjustment to T2S

T2S will require new investments for some market participants. For CSDs, the evaluation of new developments are already accounted for in the additional CSD costs and the resulting AvF_{total} .

Users have evaluated the additional investments needed to obtain back office benefits against savings on investment costs (communication, software/hardware, any other required infrastructure and related fixed costs, pro-rated if necessary). For methodological consistency, these estimates are based on an amortisation period of six years and a capital cost of 6%. Some Users will prefer to passively benefit from T2S, only taking benefit from lower CSD fees or lower custodian fee; they will not have to invest specifically for T2S.

In addition, the EIA takes into account that the amortisation period of six years leaves 1/6 of settlement related investments in the year before the expected final decision of the Governing Council in July 2008 non-recovered. These investment costs may be included in the costs of adjustment to T2S.

3) Back office savings in running costs

T2S will allow T2S Users to use a single process for the settlement of all European securities transactions. The harmonisation of operating procedures / processes as covered in the current version of the URD will reduce complexity and reduce fail rates.

Furthermore, some T2S Users will opt for direct connectivity to the settlement platform if they see net benefits from this option.

4) Liquidity / collateral savings

T2S will overcome market fragmentation and create a single pool of assets. T2S Users will be able to centralise liquidity in a single central bank cash account. T2S Users will be able to manage collateral optimising their funding costs, as T2S eliminates the need to hold excess collateral in different national securities accounts. Additionally, T2S will reduce collateral settlement needs by having a single engine / algorithm and extend auto-collateralisation to all CSDs. These savings will be complemented by savings from two other Eurosystem market infrastructure projects, TARGET2 and CCBM2. The annex provides an overview of the collateral savings that are triggered by T2S and the complementarities to TARGET2 and CCBM2. The EIA includes only collateral savings attributable to T2S.

For some broker/dealers, the benefits will be passed through from their (global) custodian(s). In this case, no benefit is counted by broker/dealers in order to avoid double counting. In case the benefit realisation requires prior investments, those need to be netted against the savings.

5) Other net benefits

During its meeting in March 2008, the AG discussed three lists of harmonisation benefits. Harmonisation list A comprises harmonisation cases being part of the current version of the T2S URD. These are already included in the baseline scenario. Harmonisation list B, which comprises clarifications of specific harmonisation cases, which may become part of the T2S URD, has not yet been approved, so its benefits are therefore not included in the EIA. Harmonisation list C, for which T2S will be a catalyst, together with other initiatives (e.g. Code of Conduct), will not be taken into account in the EIA. Hence,

harmonisation benefits are very conservatively calculated.

As part of the EIA methodology, market participants may indicate the scale and importance of the new business opportunities they envisage. These estimates will be used with caution as new business opportunities depend inter alia on the behaviour of other actors. The serious methodological problems are acknowledged and taken into account.

Additional benefits arising from T2S but not taken quantitatively into account in the EIA include reduced risk through increased use of counterparty-risk-free central bank money and the market-wide use of the integrated model rather than the interfaced model. Finally, the EIA is static, as it does not consider any impact from lower settlement fees on the demand for settlement services.

Data collection and aggregation of survey results

Based on a number of discussions that the ECB had with market participants during the Advisory Group meetings, during dedicated information sessions, or in bilateral talks, the ECB could already anticipate a number of comments on the EIA methodology before the end of the public consultation on 2 April 2008. In this context, and given the very tight deadlines for finalising the EIA, the ECB asked all European CSDs and a sample of potential T2S Users in an ECB survey for their data input on 18 March 2008. Potential T2S Users approached for their data input include a sample of large custodian and investor banks, as well as CCPs. A sample of smaller market participants were approached by the national central banks. Responses to the questionnaires were expected by 15 April 2008.

The T2S Project Team calculated the total impact of T2S on T2S Users as the sum of: 1) the individual impacts on all respondents to the questionnaire, and 2) the estimated impact on institutions not included in the respondents' group based on relative volumes.

3.2 Extrapolation from existing studies on the cost of European post-trading market fragmentation

3.2.1 The Clearstream approach

Clearstream²⁰ estimates the 'total incremental costs of cross-border equity cash trading and cross-border holdings in Europe [defined as EU-15]' relative to domestic trading to be €4.3 billion, of which €2 billion refer to post-trading activities. From this, Clearstream estimates higher cross-border CSD and settlement agent costs relative to domestic costs to be €1 billion in 2001²¹; the remaining EUR 1bn is attributable to higher custody costs. According to Clearstream, harmonisation of market practices and consolidation could eliminate 50% of the €1 billion extra settlement costs. The public sector in the EU could contribute a further 30% by harmonising different legal and tax systems and regulatory environments, whereas 20% reflected other non-changeable costs, such as language differences and home bias in investment decisions.

²⁰ Clearstream International, Cross-Border Equity Trading, Clearing & Settlement in Europe, White Paper, 2002.

²¹ Clearstream (2002, p. 15) calculated the incremental settlement costs with an estimated average transaction size of €150,000 and an average cost of €25 per transaction settled cross-border (adjusted for -20% proprietary trading volume in Europe).

A closer look at Clearstream's methodology reveals that it focuses on direct transaction costs for cross-border trades. Hence, it seems to exclude other additional cross-border costs such as potential cost savings from pooling of collateral. Bonds are also not included.

In order to move from the Clearstream figure of €500 million, attributable to the harmonisation of market practices and consolidation, to the impact of T2S, the analysis will take into account:

- a geographical factor for scenario 1 to account for settlement in euro in the euro area rather than in the EU-15; as ICSDs settle in commercial bank money, their volume is removed from both scenarios 1 and 2;
- an adjustment factor for the integration and harmonisation already achieved since 2001²²;
- a scope factor to include bonds, based on the share of settlement volume in the 2006 ECB Blue Book for equities versus all other securities T2S would settle;
- additional benefits from collateral savings, based on discussions with individual players in five European markets which will be covered by T2S, and applying a conservative cost of collateral of 8 basis points.

As part of the conservative approach, the rescaling does not include the growth of settlement volume by more than 75% in the euro area since 2001.

3.2.2 The Euroclear approach

Euroclear has published several estimates of the potential savings from the integration of the European post-trading market infrastructure in recent years. The first Euroclear estimate in 2003 of the excess costs of European market fragmentation amounted to € billion per year²³. Euroclear clarified in the AG meeting on 23-24 October 2007 that it calculated this figure after a very broad assessment of the extra costs of cross-border trading, clearing, settlement and custody for equities and bonds.

Later, Euroclear published potential annual savings of €300 million from the implementation of their Single Platform in its five domestic markets (Belgium, France, Ireland, Netherlands, UK) and the international market covered by Euroclear Bank. This figure would rise to €700-800 million if the Single Platform were to expand across Europe.²⁴ The estimated savings, focusing on equities, consist of transaction cost and back-office savings for Euroclear clients as well as Euroclear's internal savings. It does not include liquidity and collateral savings. The Euroclear results cover a broader scope than T2S in terms of the value chain since they include not only settlement but also corporate actions and safekeeping. T2S Project Team discussions with Euroclear show that about one-third of these savings is attributable to settlement. In order to move from the Euroclear figure of €700-800 million to the impact of T2S, the analysis will take into account:

²² This factor is based on the achieved integration and harmonisation by Euroclear, i.e. the face value of Euroclear's original benefit realisation plan for the implementation of Euroclear Settlement of Euronext-zone Securities (ESES) and the Euroclear Single Platform, although the Euroclear project has suffered from some delays.

²³ Euroclear, Delivering low-cost cross-border settlement, January. 2003, p. 7.

²⁴ See, e.g. Euroclear, The view from the CEO of Euroclear, Apr. 2006, p. 3.

- a geographical factor for scenario 1 to account for settlement in euro in the euro area rather than coverage of 'Europe' as defined by Euroclear; as ICSDs settle in commercial bank money, their volume is removed from both scenarios 1 and 2;
- an adjustment factor for benefits already achieved by Euroclear in the euro-area²⁵;
- an adjustment factor to include bonds, based on the share of settlement volume in the ECB Blue Book 2006 for equities versus all other securities T2S would settle;
- a scope factor to adjust for the smaller coverage of the value chain by T2S;
- additional benefits from collateral savings, based on discussions with individual players in five European markets which will be covered by T2S and applying a conservative cost of collateral of 8 basis points.

It is important to emphasise that the rescaling of the Clearstream and the Euroclear studies results in estimates of the gross benefits of T2S. The quantitative impact analysis based on the ECB survey in section 3.1.5, however, explicitly includes the costs both for the Eurosystem to build T2S and for market participants to adapt to T2S. Therefore, the quantitative impact analysis calculates the static net benefits of T2S for T2S Users.

3.3 Social welfare - Dynamic effects of T2S

All quantitative methodologies in this chapter have in common that they focus on cost savings. T2S, however, will not only bring cost savings, but will also offer a number of new opportunities to market participants. Since these are very difficult to quantify, this section provides first a qualitative description of the direction and the ambition of the T2S project.

Overview of the economic benefits of T2S

Designing a common settlement platform is in itself a driver in promoting harmonisation. The impact of T2S on harmonisation is already being felt, building on valuable work by CSDs. For example, T2S will lead to greater cost transparency with respect to national specificities and may thus induce a reduction in divergences of practices across market segments. It will also further increase the pressure for speedy action to harmonise practices (especially in relation to corporate actions), taxes, law and regulation.

As noted in the previous sections, the adoption of borderless T2S will reduce settlement costs – particularly for what are today cross-border trades – from an end-to-end perspective. In turn, this shift to borderless markets will deliver significant benefits to end-users, especially in smaller countries. Issuers will have access to more liquid markets for fund-raising without the need to consider issuing in other countries; and investors will be able to benefit from portfolio diversification at lower cost. These benefits will require little or no adjustment by intermediaries, specifically on the capital raising side.

²⁵ This factor is based on the face value of Euroclear's original benefit realisation plan for the implementation of Euroclear Settlement of Euronext-zone Securities (ESES) and the Euroclear Single Platform, although the Euroclear project has suffered from some delays.

T2S will also create a single pool of assets – substantially all the securities held by participating CSDs – exchangeable for each other via central bank money at low cost, in real-time, and in an extremely reliable settlement system. Market participants will also be able to centralise liquidity in a single central bank cash account for a single settlement process²⁶. Together, these features will create valuable new options for commercial and investment banks in managing collateral, optimising their funding costs and avoiding settlement fails. The gains will include the benefits of enhanced competition among third-party collateral managers and liquidity providers, since such services will be more capable of being unbundled from custody provision. The reduction in costs, from indications given by market participants, is likely to be very substantial. This will feed through to reduced trading spreads and lower service prices, thus improving welfare.

There will be other effects on, and gains through, enhanced competition, inter alia in the areas of custody and securities trading. Cheaper trading might imply an increase in trading volume and thus more liquid markets, resulting in lower spreads. T2S will also contribute – in addition to other initiatives such as the Code of Conduct – to fostering competition between CSDs that so far operate largely in national monopolies.

These short-, medium- and long-term economic benefits have to be compared with the initial investment costs associated with the building of the T2S platform.

The EU Commission's approach

The European Commission²⁷ has tried to quantify parts of these dynamic effects. The Commission estimated that the complete integration of the European post-trading market infrastructure could result in a potential annual cost reduction of €2.5 billion, and thus create an increase in the level of GDP of 0.2-0.6%. T2S is a step towards complete integration: the question is therefore how much it could contribute to this total.

The Commission study relies on the following economic relationships: lower transaction costs increase share prices. Higher share prices are associated with lower cost of capital for listed companies. The lower cost of capital induces firms to invest more and thus increases the economy's capital stock. The higher capital stock in turn raises the economy's production, i.e. its level of GDP. There is broad empirical evidence that supports this view. More precisely, the Commission study proceeds in three major steps:

1. estimation of the excess cost of cross-border post-trading in EU (static cost of fragmented market);
2. transfer of transaction cost reduction into an estimate of capital cost reduction;
3. transfer of capital cost reduction into an estimate of the welfare effect, measured as a GDP increase.

²⁶ See the annex for further details on savings in liquidity and collateral from T2S and the complementarities to TARGET2 and CCBM2.

²⁷ European Commission, Draft Working Document on Post-Trading Activities, May 2006. This document builds on a previous study by London Economics, Quantification of the Macro-Economic Impact of Integration of EU Financial Markets, Final Report to the EU Commission, 2002.

Hence, the underlying assumption of the methodology is that a reduction in transaction cost serves as the driving force for the positive welfare impact of market integration. The European Commission uses the results of the original Clearstream and Euroclear studies described above for the first step of their analysis. The second and third steps represent a method for quantifying the dynamic welfare effects of market integration. Their basis are the empirical estimations of: 1) elasticities of cost of capital to trading turnover and transaction costs, and 2) the elasticity of capital stock to the cost of capital. Moreover, a standard production function is used to estimate the GDP impact of changes in capital costs.

As T2S has a different scope from the one assumed in the original Clearstream and Euroclear studies, the cost impact of T2S as estimated in the previous sections also differs. Nevertheless, it is possible to follow the second and third steps of the methodology to quantify the dynamic welfare effects of T2S under the assumption that sufficient competition at all levels of the value chain will cause a pass-through of net savings towards investors and issuers.

The T2S static impact analysis will be the input to step one of the Commission's model. There is evidence from market participants²⁸ and from empirical studies²⁹, which supports the hypothesis that lower transactions costs cause lower capital costs, the second step of the Commission's model. Whereas no study shows a negative relationship, the precise quantification of this effect is subject to some debate³⁰. In order to circumvent the uncertainty around these estimates, the dynamic GDP effects are calculated for the grid of elasticities between 0.05 and 0.30.

The third step of the Commission's model uses the elasticity of capital stock to the cost of capital. The lower cost of capital induces firms to invest more and thus increases the economy's capital stock. Based on the empirical shares of capital, as an input factor in the economy modelled as a standard production function, and of the relevant financing sources, the Commission methodology finally transfers the increase in the capital stock into an estimate of the GDP effect of market integration.

²⁸ Many banks use algorithmic or programme trading to exploit arbitrage opportunities. If trading costs decrease, the trading programmes increase their trading volumes, which lowers liquidity spreads, raises market valuations and lowers the capital costs of listed companies.

²⁹ See, e.g. T. Hendershott, C. M. Jones and A. J. Menkveld, *Does Algorithmic Trading Improve Liquidity?*, Working Paper, 2007; *Technological Innovation and Economic Performance*, Princeton University Press; Oxera, 2007, *Stamp duty: its impact and the benefits of its abolition*; Steve Bond, Mike Hawkins, and Alexander Klemm, 2005, *Stamp Duty on Shares and Its Effect on Share Prices*, *FinanzArchiv* vol. 61 no. 3 pp. 275-297, I. Domowitz and B. Steil, 2001, 'Innovation in Equity Trading Systems: The Impact on Transaction Costs and Cost Of Capital', in B. Steil, D. Victor, R. Nelson (eds.) (2002), Some of these studies analyse the stamp duty tax in the UK as an example of trading transaction costs. A welfare analysis of this issue is more complex than in the case of T2S as the benefits have to be weighted against the loss of government revenue from a tax reduction. In the T2S case, the lower transaction costs in particular for cross-border trades are true efficiency gains.

³⁰ Domowitz and Steil (2001) estimate that the elasticity of the post-tax cost of equity to transaction costs is 0.14–0.17. EU Commission (2006) estimates 0.1908 for the elasticity of capital costs with respect to trading costs. See NERA Economic Consulting, 2007, *The European Equities Post-Trading Industry: Assessing the Impact of Market and Regulatory Changes*, for a critical, but also positive review of the Commission (2006) study.

All of the quantitative results derived in the previous sections can be used for this exercise as a measure of the static cost impact of T2S. Table 5 provides an overview of the results:

Table 5: Overview of quantifications of the social welfare impact of T2S

	Static cost impact	Dynamic GDP effect
ECB survey	x	x
Rescaled Clearstream study	x	x
Rescaled Euroclear study	x	x

However, this quantification does not include all possible dynamic effects that T2S may cause and that are described above. In particular, it does not take into account the possible changes in behaviour of various market participants as they adapt to the new environment, or the possible impact on total factor productivity caused, for example, by an improved risk-return relationship on investments. The EU Commission (2006) calls these effects “second-order dynamic effects” and concludes that the methodology applied above very likely underestimates the potential increase in GDP³¹.

³¹ This view is confirmed by the economic literature on the impact of financial integration. For example, Peter B. Henry, Capital Account Liberalization, The Cost of Capital, and Economic Growth, in: American Economic Review, 93(2), 91-96, 2003, shows that financial integration raises the growth rate of capital via the cost of capital, but that the more important effect on output (GDP) per worker comes from increased total factor productivity growth.

SUMMARY OF SAVINGS IN LIQUIDITY AND COLLATERAL FROM T2S AND THE COMPLEMENTARITIES TO TARGET2 AND CCBM2

T2S will bring important benefits for T2S Users in terms of savings in liquidity and collateral. T2S is not the only Eurosystem project aiming at consolidating the European post-trade infrastructure; the European platform for cash settlement in central bank money (TARGET2) and the harmonised solution for Eurosystem collateral management (CCBM2) share the same vision. Overall, it is important to note that the three projects should not be considered as three parallel solutions that consolidate fragmented infrastructure services in three different business domains; their vision goes much further: TARGET2, T2S and CCBM2 are three complementary and mutually beneficial services that will bring significant benefits to European post-trade infrastructure.

TARGET2 is a market infrastructure system that focuses on pure cash real-time gross settlement (RTGS) services. It also offers some additional features, such as management of minimum reserves and standing facilities, as well as provision of home accounts. It is therefore mainly designed for and used by market participants active in the payments business and ancillary systems. CCBM2 can be seen as an internal rationalisation of the systems used by central banks for providing collateral management services in the context of Eurosystem credit operations. It is therefore mainly aimed at central banks and their eligible counterparties. T2S will serve as a technical infrastructure providing securities settlement services in euro (and potentially) non-euro central bank money through central securities depositories (CSDs) to their participants. It is designed so that CSDs can integrate it with the other services they provide and offer a complete system to their customers.

T2S will replace the existing multiple settlement engines in Europe and offer the possibility of a single pool of assets and centralised liquidity in a single central bank cash account for securities settlement in Europe. These features will benefit T2S Users in managing collateral, optimising their funding costs and avoiding failed deliveries.

In particular, T2S will abolish the need for market participants to hold buffers of collateral and liquidity when settling in several European markets. Therefore, banks need to hold excess collateral on average because they cannot reuse the surplus of collateral and liquidity in a settlement system in which they are long. At the same time, they need to maintain a precautionary buffer in collateral and liquidity for days where they will be short in this market. T2S will give banks the possibility to have a single buffer based on their global European business, as its single pool of assets and liquidity automatically nets the short and long positions between various countries.

Besides, cross-border management of collateral is generally associated with additional costs, for example because of the additional time lag in moving collateral from one securities account to another, but also

because of differences in time schedules amongst the CSDs. This fundamentally impedes quick cross-border movements of collateral to cover increased financing needs. With T2S, CSDs will use a common settlement time schedule and optimisation mechanisms, which reduce settlement needs. Finally, T2S will enable banks to use risk-free, cheaper and thus more efficient central bank money for all European settlement transactions.

These benefits are complementary to those already achieved by TARGET2. In principle, TARGET2 could already enable banks to have a single cash account for the euro area. However, it is still necessary to dedicate liquidity to certain CSDs due to settlement processes' uncertain results, and thus to allow certain liquidity buffers for each settlement engine. These buffers must not turn negative, so the aggregate amount of cash holdings is very likely to be greater than in a 'truly' single cash account for settlement purposes. The problem is aggravated by the non-harmonised schedule that only T2S will resolve, in particular ensuring simple, swift and cheap movement of collateral within Europe. In addition, auto-collateralisation is a market feature that is so far available only in few settlement engines (i.e. in few European countries) and would become ubiquitous with T2S, which will offer a harmonised and sophisticated auto-collateralisation mechanism. Given the input from some market participants, the benefits from this feature can be expected to be substantial, as it will allow the mobilisation – through automated processes provided by T2S – of intraday credit based on collateral available either in participants' stock of securities and/or through the securities being delivered. CCBM2 will interact with T2S to provide the required information on collateral in a centralised way covering all eligible assets, such as the collateral value of eligible securities, as well as on close links.

CCBM2 focuses on the Eurosystem central banks' collateral management and can be seen as harmonising the Eurosystem procedures. It also simplifies and accelerates the exchange of messages and collateral between NCBs and their counterparties. But even with CCBM2 and in the absence of T2S, banks will still need to hold several securities accounts in the markets they are settling in or at least dedicate collateral to different CSDs instead of having one single pool of assets for all European collateralisation and settlement.

The efficiency, complementarity and full interoperability of T2S, TARGET2 and CCBM2 make them mutually beneficial.

For instance, the improvements in collateral management expected from CCBM2 will allow a better allocation of collateral and hence maximise the number of securities available for other settlement purposes in T2S. This will consequently improve settlement efficiency in T2S. Similarly, settlement optimisation and auto-collateralisation routines expected from T2S will optimise liquidity use in T2S, which will help to reduce the need for liquidity transfers from TARGET2 to T2S for securities settlement purposes. This will reduce the liquidity pressure on TARGET2. Collateral management will also benefit from the consolidation of securities settlement in T2S and the harmonisation of settlement processes. CCBM2 will access eligible securities held in T2S rather than connecting to several CSDs. The settlement

of collateralised credit operations will be optimised (in terms of operational costs and processing time), thus improving liquidity management.

Another example is the removal of national differences in information technology and interfaces (Giovannini barrier 1). T2S harmonises the interaction for CSDs and directly connected market participants. CCBM2 harmonises the communication between Eurosystem national central banks and their eligible counterparties for collateral, whereas TARGET2 achieves the same for payments. The only differences remain in the communication between local, indirectly connected market participants and CSDs, and between market participants themselves.

Furthermore, the three initiatives lead to a complete removal of national differences in operating hours and settlement deadlines (Giovannini barrier 7) as they harmonise operating hours and cut-off times for settlement (T2S), collateral (CCBM2) and payments (TARGET2).

In other words, the intrinsic benefits of each service, T2S, TARGET2 and CCBM2, will have a positive impact on the other two services, thereby increasing the overall efficiency of the three services. Market users will profit directly from these three services. The combined overall benefits of the three services are expected to be greater than the benefits of the individual services.