Seminar Paper

Financial Crises, Capital Controls and the Tobin Tax: Answers to Globalisation of Financial Markets

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Abstract: This paper analyses capital controls with a focus on conversion taxes as proposed by Tobin and Spahn. To understand the problems associated with these models, it first offers a description of the foreign exchange markets and their decentralized, concentrated form of organization. In a second part, the paper turns to financial crises, their causes and their costs both domestic and international. Central issues are bad allocation of resources, loss of information in the banking sector and contagion. In a third part, the paper analyses capital control models as preventive measures to such events, with a focus on conversion taxes. The paper shows possible advantages of capital controls in general (a more independent monetary policy) and of conversion taxes in special (systemic stability and tax payoffs). It then turns to counterarguments to conversion taxes. A Tobin tax would punish all short-term investors indiscriminately. It would rise hedging costs. There is a tax evasion problem not easily to be overcome. The paper ends with a simple, qualitative model where a Tobin tax increases volatility contrary to expectations. The paper concludes, that Spahns proposal shows most promise, it the remaining issues, mainly related to hedging costs, can be overcome.

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The role of the international capital market

When Adam Smith in 1776 wrote his "Inquiry into the Nature and Cause of the Wealth of Nations", he was the first to formulate the idea of market forces leading to a wealth-maximizing outcome. Although almost 230 years old, it is this idea which shapes the beliefs of most of today's economists, albeit in a refined, more complex form.

Today, economists see two major economic functions fulfilled by international capital markets – and by markets in general:

1.) the allocation of resources

2.) the allocation of risk

The first function relates to the allocation of capital to where it can generates the biggest marginal returns. The second function is no less important than the allocation of capital as a productive factor. Capital is moved around according to the risk preferences of investors.

Market efficiency is highly evolved in capital markets nowadays. Financial capital is by far the most liquid, most fungible of all production factors. Thanks to modern communication networks today it is most simple to move huge amounts of capital around the globe in a matter of seconds.

Obstfeld (1998) mentions a third potential role of liberalized capital markets: to discipline policymakers who might try to exploit a captive domestic capital market. "Unsound policies [… would lead to] capital outflows and higher domestic interest rates."[1] In extreme cases, even a crisis is possible.

[1] Obstfeld (1998), pp. 10

How foreign exchange markets are organized

Having determined the role of markets in general and the role of the international liberalized capital market in special, it may now be worthwhile to examine more closely how the latter is organized, as market structure and organization have considerable impact on the problems to be addressed with this paper.

This chapter first examines the market organization of currency markets in a qualitative, matter-of-fact way.

The market for foreign currencies, the foreign exchange market, is relatively young in it's form observed today. Through most of younger economic history, exchange of foreign currency was controlled heavily, first through the gold standard, and after World War Two through the Bretton Woods system of pegged exchange rates. On August 15 1971, however, the convertibility of the US-Dollar into gold was suspended, and the Dollar was set free to find it's own level in currency markets. This marks the factual end of the Bretton Woods system, which had governed the main international currencies for the previous thirty years.

For the following thirty years, turnover in foreign exchange markets increased more or less every year and reached a peak in 1998 with estimated 1'490 billion USD every day,[2] although it declined somewhat since then, mainly for systemic reasons and because of the introduction of the Euro.

Market participants and organization

Unlike securities markets, which are centralized at an exchange and transparent, foreign exchange markets are decentralized, dealer-driven markets with little

[2] Bank for International Settlement (2002), pp. 5

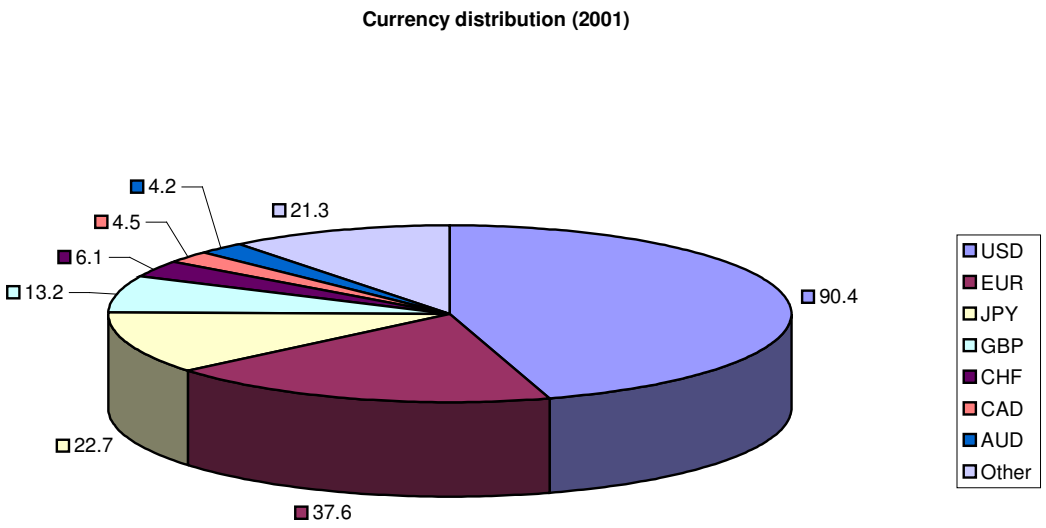
transparency: there is no such thing as a "currency exchange". The structure of supply and demand and the price at which a deal is concluded in foreign exchange markets are non-public information. Even, as Frankel (1996) points out, "the ability [for dealers] to earn a living hinges on their skill at gleaning more information from other traders […] than they reveal."[3]

The market structure of foreign exchange markets stems from a time some forty years ago, when pegged exchange rates were predominant with central banks at the helm. Foreign exchange trading was the domain of a few large business and central banks around the globe with a small number of traders.

Only when in the late 1960s and early 1970s the Bretton Woods agreement began to tumble, volumes grew. But market structure remained: In 2001, 75% of global foreign exchange turnover was generated by about 110 trading desks.[4] Note, that this number corresponds to individual offices of trading firms in different countries, rather than banking organisations, because of the data collection by national central banks. This implies, that statistics on global concentration in the banking sector (e.g. the number of banking organisations accounting for 75% of global trading) cannot be calculated. However, this number would certainly be lower, maybe even as low as about forty institutes (i.e. 110 / 3), as many of the big banks operate three trading centres, one in Asian, one in European and one in American time zones.

[3] Frankel (1996), pp. 46f
[4] Bank for International Settlements (2002), pp. 10.

The foreign exchange market consists largely of four currencies: US dollar, Euro, Japanese yen and Pound sterling make up for almost 164% of all deals.[5]



Graph 1

Source: Bank for International Settlements (2001), Table B.4, pp. 9 , and author's calculations.

Foreign exchange markets trade on a 24-hours worldwide basis. The self-regulation organisation of foreign exchange dealers, the Association Cambiste Internationale (ACI), has set normal market hours from Monday morning 5 a.m. Sydney time to Friday evening 5 p.m. New York time all year round.[6]

Today, all market making banks sustain 24-hours trading with either dealers in one centre working in shifts, or with a so called global book, where dealers in different centres and time zones contribute to the same book.[7]

[5] Because two currencies are involved in each transaction, the sum of the percentage shares of individual currencies totals 200% instead of 100%.
[6] Association Cambiste Internationale (2004), pp. 23
[7] In the latter case, there may be one trader for CHF in Tokyo who, after he's done a day's work, "sends" the book to the CHF trader in London. In London, the CHF trader takes over the book, manages it through European business hours and in the evening "sends" the book on to the CHF trader in New York. The trader in New York in turn manages the book through American business

Note, that any given client will be indifferent between when and where he buys or sells his currency. Market makers thus maintain sophisticated order systems, making sure that as soon as the client's desired price becomes available in the interbank market, the trader of the bank will execute the deal.

Financial crises

More or less regularly, foreign exchange markets are hit by financial crises, where one currency depreciates heavily very fast. This chapter presents possible causes for such events and illuminates the associated economic costs.

Causes

Financial crises can have two basic origins. One is a debt crisis, where the government engages in an unsustainable fiscal policy, that is when it is trying to violate its budget constraint. At some point in time, outside (market) developments will force it to abandon the policy. Usually, such a change of policy takes the form of a crisis instead of a soft transition, inflicting high costs upon the domestic economy.
Crises of that kind can be seen as a disciplinary measure of the market against the bad fiscal policy of the government, a form of market discipline similar to that of bank runs. But, like bank runs, the instrument of a financial crises appears blunt and not very cost-efficient. The crisis will presumably drive government out of office, but the costs to the domestic economy are massive: bankruptcies in both the financial

hours and then again "sends" the book back to the CHF trader in Tokyo, for whom another working day just begins.

and industrial sector, a sharp drop in aggregate demand, social costs of unemployment and transition costs of restructuring the domestic economy.

The second origin stems from a sudden reassessment of return expectations or risk by foreign investors. Suddenly, the economy moves from a state where foreign investors are buying large quantities of domestic assets to a situation where they are buying few or none. This means that the trade balance will swing toward surplus, demanding a depreciation of the real exchange rate. The depreciation in turn leads to an increase in the price of foreign goods, thus reducing welfare and increasing inflation. In addition, the depreciation tends to raise output in export and import-competing sectors, while reducing it in other industries.

The transition belt of the crisis lies in the intermediary function of banks. Some factors of a crisis will reduce the willingness or ability of the banking sector to lend capital. A situation of "credit rationing" can occur, in which some borrowers are denied loans, even if they are willing to pay a higher interest rate. This reduces investment activity of industrial firms, which reduces GDP and in turn social well-being.

Several factors can create credit rationing.[8] Most straight forward: if the banks' balance sheets deteriorate, they have to either cut back lending or raise new capital. The reason for such a deterioration can be asset-based (mainly defaults on corporate loans, but also draining on cash reserves through higher prices) or liability-based (if liquidity preference and thus money demand rise). Raising new capital may prove difficult. For a bank from an economy in crisis, refinancing on the international

[8] Mishkin (1999), pp. 6 – 9 gives a comprehensive overview, but his arguments boil down to the two main arguments mentioned here: credit default losses and interest rate effects.

capital market is expensive if not impossible, and the expansion of deposits may be prohibited through the regulator, as this would mean a risk shift to depositors.

Another reason for drops in lending volume are increases in interest rates. Rising interest rates aggravate the problem of adverse selection in lending, because with rising interest rates prudent borrowers may not be able or willing to borrow, as their capital costs would exceed their expected profits, and only borrowers with high-return-high-risk investment projects remain.

Increasing interest rates have a second effect, related to the duration gap inherent in a typical bank balance sheet. Usually, liabilities of a bank are very short-term: depositors can redraw their deposits whenever they like. The asset side of a bank in turn is long-term: company credits and mortgages are not easily liquidated, or only at big "fire sale premiums". So, if domestic interest rates rise, the bank will be forced to rise the interest rates on their deposits, otherwise people would withdraw their capital, run the bank and ultimately force it into failure because of illiquidity. On the other hand, company loans and mortgages are likely to have fixed interest rates. Thus, even if the bank can avert the run, its costs increase while its income remains, and ultimately the bank is driven into failure because of insolvency.

Domestic costs of financial crises

Note that government default in itself is not an economic cost, but a redistribution of wealth from lenders to taxpayers and, insofar as some government debt is held by foreign investors, from foreigners to domestic residents.

But there are costs of a financial crises. The crisis creates a sectoral shock, that induces a reallocation of labour and other inputs among sectors. And because this

process does not happen instantaneously, the result is a temporary rise in unemployment and suboptimal allocation of resources.[9]

As mentioned above, a crisis can have considerable effect on the domestic banking sector. Bank runs or even a banking panic becomes possible. One of a bank's justification as financial intermediary is it's ability to pool funds and effectively monitor its borrowers. A well established bank possesses a huge stock of information, long-term relationships, knowledge of its clients, not only in its on-balance operations, but also in its off-balance business. If an institute is forced to close, this intangible capital of information is lost to society. Apart from that, bank runs and banking panics are likely to produce unwanted wealth redistribution, as the few people coming first and actually starting the terminal run get the most of their money back, whereas the majority of depositors loses their whole capital.

Non-domestic costs and contagion

In today's sophisticated and entwined capital markets, a crisis in one country will inflict costs not only on domestics, but on foreigners as well. Insofar as foreign banks are lenders to the domestic government, a default on government debt only means a redistribution from foreigners to domestic residents. But insofar as foreigners are direct investors into domestic industries, they bear their share of bankruptcy costs.

A crisis has severe consequences for an economy. Among others, it often leads to defaults of banks in the country hit by the crisis. Through interbank lending, as is common market practice to cover excess liquidity demand or supply, the default of a borrower bank can put the lending (foreign) bank into problems as well, although it is not directly affected by the crisis. The default of the borrowing bank will

[9] Romer (2001), pp. 574f

deteriorate the balance sheet of the lending bank very suddenly and often in large amounts. Other factors may arise as well: foreign investors with accounts at the foreign bank may be forced to draw deposits to cover their losses incurred in the crisis economy; foreign industry firms may get into financial trouble, because either their clients or suppliers have become insolvent through the crisis; people might perceive a high risk of the crisis spreading to their own economy and thus running the bank (the latter being a self-fulfilling expectation). When a crisis spreads from one economy to another, one speaks of contagion.

Caramazza, Ricci and Salgado (2004) find evidence primarily for what they call the "common creditor argument": that investors who have positions in a country hit by a crisis will usually want to reduce their now-increased risk exposure and thus sell assets with high volatility and / or positively correlated with assets from the crisis country. Investors may also be forced to sell assets for other reasons, such as when the reduction in portfolio value produces immediate need for cash to meet margin calls. In their analysis of 41 emerging markets, Caramazza et al find that the "common creditor variable is the most important, robust, and significant variable. This variable alone has half of the explanatory power of the benchmark regression and, jointly with slow output growth, provides the largest contribution to the probability of a crisis."[10]

Systemic instability

Although contagion is a relatively new concept, it appears to play an important role in recent crises in emerging markets, most of all in the south-east Asian crisis of 1997-98. The question remains, if similar forces that spread the crisis from one

[10] Caramazza, Ricci and Salgado (2004), pp. 66

regional economy to another are absent on a global scale, or if global contagion could arise because of "common creditors". There are factors militating in favour of the thesis, like the high concentration in foreign exchange markets with only some 110 trading desks accounting for 75% of volume. Other factors militate against the thesis, like the mere size and diversification of the global economy.

However, it appears, major central banks are not willing to take the risk of a global system failure. When in 1998 Russia defaulted on its debt and LTCM, a major hedge fund, busted, the New York Fed opted to organize a group of large private banks to bail-out the stricken hedge fund. This allowed LTCM's positions to be reduced in an orderly manner of time, thus preventing illiquidity effects in the various markets LTCM was engaged in with unforeseeable consequences for the global capital markets system.[11]

Capital control models

Having determined causes and costs of financial crises, the paper now turns to capital controls, which are devised to prevent such events from happening.

In principle, capital controls take two basic forms: either, they rely on administrative measures, or they take the form of a tax or tax-like instrument. Whereas administrative measures always have the goal to prohibit at least certain transactions, taxes and tax-like instruments increase the cost of international transactions. That is, administrative controls affect traded quantities irrespective of

[11] Committee on the Global Financial System (1999) comprehensively reviews the events of autumn 1998 and puts them in a broader context.

the price, taxes and tax-like instruments affect the price and leave the quantities unrestricted.

Convertibility restriction

The most basic form of capital controls are regulatory restrictions on the transfer and convertibility of capital across borders. Such measures were widely used after World War II, when it took more than 15 years for most European countries to return to convertibility. But convertibility restrictions hamper all three market functions, and thus most probably do not lead to Pareto efficient outcomes.

One rather new approach to combine the positive effects of convertibility restrictions with open capital markets are non-deliverable forwards, which work like outrights, but with settlement in the non-restricted currency (usually USD) at maturity instead of delivery.[12]

However, in today's highly developed markets with sophisticated trading technologies, administrative restrictions are not very practical. An extensive bureaucratic apparatus is required to track, register, evaluate and authorize capital transfers, to monitor the regulating institution and to enforce restrictions. Such a system has big upfront costs to install, considerable running costs and may be difficult to dismantle again.

The Tobin tax

For the reasons given above, convertibility restrictions – although widely in use, mostly in emerging and developing markets – probably are not the first-best solution. This paper thus concentrates on tax-based models as proposed by Tobin and Spahn.

[12] For further information and examples, refer to http://my.dreamwiz.com/stoneq/articles/ndf.htm

In 1972 and again in 1978, James Tobin introduced the idea of "an internationally uniform tax on all spot conversions of one currency into another, proportional to the size of the transaction"[13]. Because prices in goods and labour markets move more slowly than prices of financial assets, "[n]ational economies and national governments are not capable of adjusting to massive movements of funds across the foreign exchanges" and therefore "the currency exchanges transmit disturbances originating in international financial markets."[14]

Tobin identified the best solution to be a common currency, common fiscal and monetary policies and economic integration, as this would ultimately solve all exchange-rate related problems.

Tobin was aware, however, that such global economic integration was not feasible, at least in the foreseeable future, and that the only solution could be greater financial segmentation to allow central banks and governments more autonomy in policies. Tobin thus proposed a transaction tax of 1%, which would lead to more independence of national interest rates and would discourage short-term speculation: for short-term, speculative investments into a foreign currency to be worthwile, an 8% differential in the annual yield of three-month Treasury bills was necessary, or a 2% differential on one-year maturities.

Tobin's proposal did not get a warm welcome. The main argument went that a tax as high as proposed by Tobin would mean massive disturbances to capital markets, increase hedging costs over any tolerable level and thus would lead to non Pareto efficient outcomes.

[13] Tobin (1978), pp. 155
[14] Tobin (1978), pp. 154

Even Tobin himself reconsidered the tax rate: in 1996 he stated that the tax rate "should not exceed 0.25% and perhaps should be as low as 0.1%."[15] But a tax so low would hardly discourage speculation. As Visser (2000) points out, if "market participants expect a substantial change in a currency's parity, a one-half per cent tax only increases the costs of speculation marginally and will often not be sufficient to deter such speculation."[16]

Spahn's conversion tax

The big dilemma of Tobin's tax model – that a tax sufficiently high to deter speculation would produce major distortions of international capital markets – was addressed by Spahn in 1996. He proposed a two-tier tax. In usual trading conditions, a tax with some very small rate would be charged, but in times of crisis, there would be a surcharge at a considerably higher rate.

The underlying conversion tax would only raise costs of capital insignificantly; Spahn proposes a rate of 2 basis points on spot and forward transactions and 1 basis point on derivative trades.[17] The sole reason for the minimal-rate tax is to constitute the operational and computational vehicle for the surcharge.

The aim of the surcharge instead is to tax the negative externalities associated with excessive volatility: it would only be due if and when the trading price for a currency left some predetermined band, which would be calculated from a crawling peg or moving average plus a safety margin.

Whenever the surcharge is activated, transaction costs would rise significantly. This should induce markets to smooth out large fluctuations to avoid these high costs.

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[15] Tobin (1996), pp. XVII
[16] Visser (2000), pp. 153
[17] Spahn (1996), pp. 28

The sensitivity of the surcharge would be determined by the width of the safety margin and by the interval the moving average is calculated from. The wider the safety margin and the shorter the interval, the more volatility is allowed.

Ideally, the surcharge of Spahn's two tier approach would not generate any revenue, as it should deter any deals that would spur the surcharge ex ante. Should the surcharge come into effect, Spahn suggests to give traders the right to recontract, because transaction costs could not be known in advance. This, Spahn argues, would make it even more difficult to spur speculative attacks, as traders would withdraw from markets during periods of large fluctuations in prices.[18]

Other models

Other models for capital controls have been proposed, whereof some have been or were in effect. Dual exchange rates for example apply different exchange rates to commercial transactions and financial transactions. While transactions for current account transactions are subject to a pegged exchange rate, the financial rate is allowed to vary. The pegged rate protects trade from adverse effects of volatile exchange markets, while the floating rate leaves the capital markets the capability to allocate risk and capital optimally. The drawback of this approach is leakages between the two markets. As Eichengreen and Wyplosz (1996) point out, "[t]he incentive to disguise capital account transactions and funnel them through the commercial market grows with the gap between the commercial and financial rates. Experience suggests that dual exchange rates work well only when the gap between

[18] Spahn (1996), pp. 27

the commercial and financial rates is small – meaning that they work least well during crises."[19]

Capital control models can take very different forms: in Switzerland in the 1970s, negative interest was paid on swiss franc accounts held by foreigners. In Germany, special reserve requirements on foreign bank deposits were in place. In Italy and Spain, they take the form of special deposit requirements for banks on their net foreign currency deposits. In Australia, Chile and Colombia, special deposit requirements exist on banks' foreign borrowing.

Advantages of capital controls

Autonomy of monetary policy

Given perfect capital mobility between countries, the exchange rate adjusts immediately to balance out differences in interest rates. This leaves any central bank with the so called trilemma: it faces a fundamental tradeoff between fixed or pegged exchange rates, open capital markets (with all positive effects on allocation efficiency) and other, domestic goals (like inflation or growth targets).

The Tobin tax applies at the openness of capital markets. It increases transaction costs and thus gives central banks some leeway in designing their monetary policy, i.e. interest rates. A Tobin tax of 1% e.g. could be overcome only by an 8% differential in the annual yields of 3-month treasury bills or a 2% differential for investments with one-year maturity.

[19] Eichengreen and Wyplosz (1996), pp. 25

Tax payoffs

A conversion tax would yield considerable payoffs. With daily turnover of USD 1'200 billion a day, a tax as proposed by Spahn at 2 basis points would yield approximately USD 200 million a day, or about USD 50 billion annually (ignoring volume effects).

Felix and Sau (1996) give an overview of possible tax payoffs based on 1992 turnover data. Given different pre-tax transaction costs, different elasticity and tax rates of 0.1%, 0.05% and 0.003%, their revenue estimates range from USD 4.3 billion to USD 139.6 billion annually.[20]

The proceeds from the tax could be used to fund international organisations like the IMF or the World Bank Group. Some of the proceed would have to be left with the national countries though, as incentive to introduce and enforce the tax.

Stabilizing effects and reduced uncertainty

Capital controls, foremost the tax-based models of Tobin and Spahn, are supposed to reduce volatility. It then becomes easier for importers and exporters to predict future exchange rate levels. Thus, it gets easier to determine the optimal price for their goods.

In addition, both Tobin's and Spahn's tax models are designed to deter short-term speculation. This would most probably also smoothen capital flows in times of turmoil: as transaction costs are high, investors are supposed to have a higher threshold for withdrawing their funds from an economy hit by or in danger of a crisis. This in turn may give domestic business banks the time to adjust their behaviour to the new situation, bank failures would diminish, as there would be fewer runs by

[20] Felix and Sau (1996), Table 9.5, pp. 242

foreigners. By the same token, conversion taxes may reduce the risk of contagion through interbank lending. However, if an economy is hit by a crisis despite the conversion tax, and if the common creditor argument holds, even conversion taxes will not be able to prevent contagion.

Counterarguments

Some authors[21] have argued, that we do not in fact observe excess volatility; that any tax in an efficient market would produce deadweight losses; that financial crises serve as an important mean to punish not well behaving central banks and governments.

This paper takes out four arguments and discusses them in some more detail: Is short-term speculation (which conversion taxes are bound to deter) always a bad thing? How does a conversion tax influence hedging costs? It addresses the issue of tax evasion, and last but not least, the paper questions the premise that a conversion tax would reduce volatility.

What is speculation?

Capital controls, and especially conversion taxes like the models proposed by Tobin and Spahn, are meant to deter short-term speculation. But speculators play a vital role in the functioning of capital markets.

In a liquid market, in every instant supply equals demand. Prices adjust, so that this market clearing condition holds. But it is not self-evident, that in every (or any)

[21] see e.g. Haberer (2003) for a detailed overview of counterarguments

instant the real demand for e.g. USD against EUR should equal the supply of USD against EUR.

Two processes help keeping the markets in equilibrium: First, cross currency arbitrage, second speculation.

Cross currency arbitrage keeps the prices (i.e. exchange rates) of various currencies consistent. If, e.g. EURUSD trades at 1.2010 and USDCHF trades at 1.2545, this implies, that EURCHF should trade at 1.5067. If in the market EURCHF trades at 1.5070, a trader can sell EURCHF on one side and sell EURUSD and sell USDCHF on the other side to profit of the mispricings. A similar mechanism works in forward markets and keeps forward prices consistent. Such arbitrage deals are riskless, as the dealer does not take a position in any currency at any time, but involve large volumes.

Even with all prices consistent, there may still be an excess supply or excess demand for a currency. To reach a market equilibrium, there must be someone, who is willing to buy or sell a currency without a real foundation of the deal, but with the hope that in the next period prices will have moved in their favour: speculators.

Speculators may, at least in theory, have another important role. If they base their expectations on fundamental indicators, their behaviour will drive markets towards fundamentally justified values. If a speculator perceives USD overvalued given fundamental indicators, he will sell the currency in the hope that the price will revert towards its fundamental equilibrium. By selling USD, speculators tend to reduce the price of USD, the overvaluation decreases. Up to this point, there is no justification for capital controls to discourage short-term trading.

Unfortunately, there are also participants in the market, who don't base their expectations on fundamental indicators, like momentum traders or chartists. These are called noise traders.

A problem arises, if speculators begin trading with each other. They may still base their price expectation on fundamental values, but their expectations will not be completely congruent. The problem will be even worse, if the expectations of fundamental speculators and noise traders do not match. Such speculation inflates trading volumes and will most probably increase volatility.

Last but not least, foreign exchange markets are susceptible to rational bubbles: when a speculator observes a fundamental mispricing in the market, and if he believes the mispricing to last and even aggravate, it is rational to follow the trend. As many noise traders follow the trend, they increasingly divert the exchange rate from the fundamentally justified level, creating a bubble. Once the bubble bursts, the correction back to fundamentally justified levels will happen within very short periods of time, inducing massive flows and huge volatility.

Most probably, it would be socially efficient (i.e. wealth maximizing) to discourage noise trading and prevent the creation of bubbles. But note that regarding their trading behaviour it is practically impossible to distinguish "real" investors, arbitrageurs, speculators and noise traders; a conversion tax thus punishes unwanted noise traders and other, desired market participants all the same.

Increased hedging costs

Whenever an investor engages in a project in any foreign currency, he or she faces an exchange rate risk, even under fixed exchange rate regimes, as these systems are susceptible to speculative attacks and crises. But the international capital market

provides instruments to allocate this risk according to any investors preferences. An investor can eliminate none to all of his exchange risk, and with the help of derivative instruments, the payoff as a function of currency prices can be tailor made exactly as to the investor's wishes.

However, to optimally asses the risk of one transaction, usually one hedging transaction is not enough, because the market maker may not be able to find a counterparty with exactly contrary risk preference to the investor's position. The market maker may choose to hold some of the risk himself (or, more probably, net it with own positions) and then resell the risk to other market participants. Five to seven transactions may be necessary, until the risk is optimally allocated.[22]

With a tax of the Tobin style, such extensive allocation procedures would be impossible because to expensive. The result is that market participants would not be willing to sell all of the risk (i.e. capital) they would actually wish to do so in absence of a tax, but bear some of the risk themselves. In that case, through raising hedging costs, the Tobin tax creates Pareto inefficient risk allocations.

Spahn's conversion tax does suffer from this problem, as it only marginally affects prices under normal market conditions. Another point, however, has to be made. In his paper, Spahn (1996) states that, once the surcharge is activated, "[t]raders would be given the right to recontract, […] because transaction costs could not be known in advance."[23] This regulation appears problematic. Not only questions it the legal certainty of foreign exchange market contracts – a big drawback in a market which even today relies heavily on firmness of word and good faith – it also generates uncertainty and makes hedging costs very hard to assess.

[22] Wahl and Waldow (2002), pp. 37
[23] Spahn (1996), pp. 27

Imagine an investor who was promised six months ago to sell USDMXN at 11.5890 tomorrow. Over the past six months, MXN has depreciated, and the spot rate has risen to USDMXN = 16.0000. At the day before the outright expires, the USDMXN rate jumps to 16.5560, and the surcharge is induced. If the investor has to recontract at 16.5560, this would generate costs which more than 40% higher than expected. The investor would prefer paying up to 40% surcharge than to recontract.

A better solution would be to enforce all contracts and instead develop specified derivative instruments, wherewith investors could protect themselves against the surcharge (e.g. a digital option, which either pays zero in case the surcharge is not induced, or the surcharge if it is in place at maturity of the outright or swap).

Level playing field

It has already been indicated, that a given customer is indifferent as to where (i.e. in what jurisdiction) he buys and sells his currency. This means, that a tax of the Tobin style has to be introduced globally and simultaneously, otherwise trading would simply migrate to a jurisdiction with no conversion tax.

It can be argued, that this form of tax evasion would not occur, because migration would be too costly. This point is at least questionable.

Given a 0.1% Tobin tax, annual revenues on 1995 turnover levels range between about USD 150 billion and USD 180 billion annually, depending on transaction costs apart from the tax,[24] whereof 75% are generated by trading of about 110 trading desks.[25]

[24] Felix and Sau (1996), pp. 239
[25] Bank for International Settlement (2002), pp. 10

If one estimates 100 banks accounting for 75% of foreign exchange turnover (a number which appears to be a relatively high estimate), and if for each institute moving it's trading facilities would cost USD 10 million up front, the global costs of migration would be USD 1 billion up front.

Assuming, that the banks can turn 20% of the savings on taxes into profit, this would yield about USD 30 billion annually. In other words: the migration would amortize in about two weeks. In these circumstances, the increased variable costs of having an off-shore trading centre appear negligible.

A proposed solution to the evasion problem is to tax transactions from countries with a Tobin tax into countries without such a tax at a punitive rate, even if the currency is not converted. However, this does not to solve the problem, because to be effective, this law would have to be implemented globally and simultaneously (the infeasibility of which was the rationale for this law in the first place). Otherwise investors could transfer funds from their home country into another country with a Tobin tax (such that they are not taxed on the transaction), and then from this host country into a third location without a conversion tax, where they could convert their funds as needed. To prevent such evasion tactics to be successful, complete disclosure of all currency transactions across borders would have to be disclosed internationally. This appears – apart from being very expensive – hard to achieve politically.

Another proposal is to raise the tax where the deal is agreed on, not where the transaction takes place. The problems appear similar here, though. With the sophisticated trading systems through phone or internet, how should one determine where the deal takes place? And even if this problem could be overcome, what about fiduciaries and trustees conducting the deal in the name of some client in some tax-

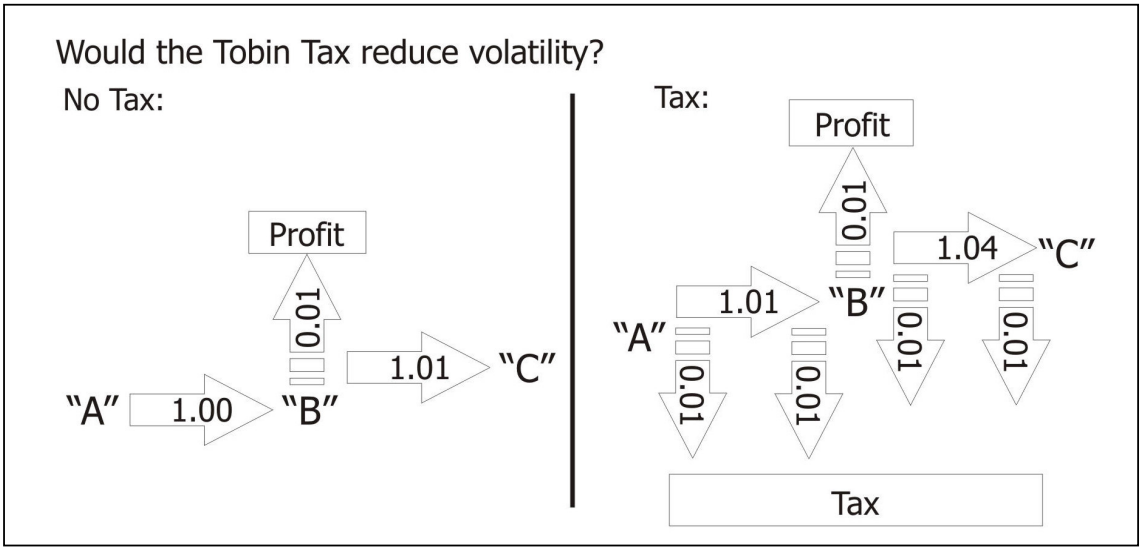
free economy. To prevent such constructs, again all fund transfers across currency borders would have to be disclosed and taxed.

Would an conversion tax reduce volatility?

Frankel (1996) offers a model, in which a reduction in short-term speculation is stabilizing.[26] That is: the bigger the proportion of long-term investors relative to short-term speculators, the lower the variance of the exchange rate, and vice versa.

This paper presents a qualitative model based on market microstructure, which leads to a diametrically opposed outcome. In this model, the introduction of a Tobin tax would actually increase volatility.

The model is a market model consisting of three players and lasting two periods. Players A and C are real investors, with immediate need for foreign exchange to pay some supplier. However, the result is qualitatively the same for risk-averse investors regarding currency risk. B is market maker, who balances markets and ensures market clearing conditions.



[26] Frankel (1996), pp. 71f.

In absence of a tax, the first transaction is concluded at 1.00, the second at 1.01, as is shown in the picture. Volatility of that trading day is about 1%.

Note that the profit mentioned is nothing but the bid-ask spread observed in all foreign exchange markets. Apart from operational profit for the market maker, this profit also includes costs of carry and in some cases a liquidity premium.

The same situation with a transaction tax of 2% (where 50% is paid by each counterparty): The first investor now wants to sell the currency at 1.01, because she faces a tax of 1% to be included in her price setting. In the second period, the market maker's best offer now is 1.04, because he has to pay 1% on the transaction with the first investor, raising his effective cost to 1.02, another 1% on the transaction with the second investor, raising his effective cost to 1.03, and of course the market maker wants to make a profit. Volatility now is roughly 3%.

Arguably, this model is highly stylized. But it takes into account the market structure of foreign exchange markets, with dealers and market makers at their centre. And even if the market maker would price in a spread the tax would still raise the price for the second investor to 1.03, resulting in a volatility of around 2%.

Summary and conclusion

This paper analyses capital controls with a focus on conversion taxes as proposed by Tobin and Spahn. To understand the problems associated with these models, it first offers a description of the foreign exchange markets and their decentralized, concentrated form or organization. In a second part, the paper turns to financial crises, their causes and their costs both domestic and international. Central issues here are suboptimal allocation of resources, loss of information in the banking sector

and contagion. In a third part, the paper analyses capital control models as preventive measures to such events, with a focus on conversion taxes. The paper shows possible advantages of capital controls in general (a more independent monetary policy) and of conversion taxes in special (systemic stability and tax payoffs). It then turns to counterarguments to conversion taxes. A Tobin tax would punish all short-term investors indiscriminately. It would rise hedging costs. There is a tax evasion problem not to be easily overcome. The paper ends with a simple, qualitative model where a Tobin tax increases volatility contrary to expectations.

As a conclusion, Spahn's proposal shows most promise, if the remaining issues, mainly related to hedging costs, can be overcome.

Capital controls have some worthwhile points, especially in reducing hedging costs, which would facilitate trade. However, international capital market take a central role in allocating both capital and risk in a Pareto efficient manner most of the time. Any interference with market forces at work has to be thoroughly weight up, as it not only potentially reduces the markets' ability in creating such Pareto efficient outcomes, but also reduces the disciplining power of the market.

Should policy makers and economists reach the conclusion that such interference is necessary, Spahn's conversion tax approach appears to be the best available choice. Spahn's proposal solves the dilemma of Tobin's model, and it has the added benefit of funding national or international organisations with its payoffs. Some issues still remain, though. And one has to realize that in drastic cases, even a conversion tax will not be able to avert crises. The only possible way to avert crisis is following sound, well-balanced policies (both fiscal and monetary) and to support well functioning, reliable market infracstructure.

Appendix

Nomenclature and abbreviations

This paper uses the currency symbols as defined in ISO 4217, the official list of currency symbols maintained through the British Standards Institution. ISO 4217 contains more than 170 symbols for national and international and precious metals. A few of the more common symbols, some of which are mentioned in this paper, can be found here.

Table 1: ISO 4217 currency and precious metal codes

Code	*Currency*	*Country*
AUD	Australian dollar	Australia
CAD	Canadian dollar	Canada
CHF	Swiss franc	Switzerland
EUR	Euro	Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, the Netherlands, Portugal and Spain
GBP	Pound sterling	Great Britain
HKD	Hong Kong dollar	Hong Kong Special Administrative Region (China)
JPY	Japanese Yen	Japan
MXN	Mexican Peso	Mexico
NOK	Norwegian Krone	Norway
NZD	New Zealand dollar	New Zealand
RUB	Russian Ruble	Russian Federation
SEK	Swedish Krona	Sweden
SGD	Singapore Dollar	Singapore
THB	Thai Baht	Thailand
USD	United States dollar	United States
XAG	Silver ounce	
XAU	Gold ounce	
XPD	Palladium ounce	
XPT	Platinum ounce	

This paper writes currency pairs as is market practice, without any delimiter between the currency codes. The price indicated is always the price of the former currency expressed in the latter:

EURUSD = 1.2015 in fact means EUR / USD = 1.2015, or in other words: 1 Euro is worth 1.2015 U.S. dollars.

Basic foreign exchange instruments

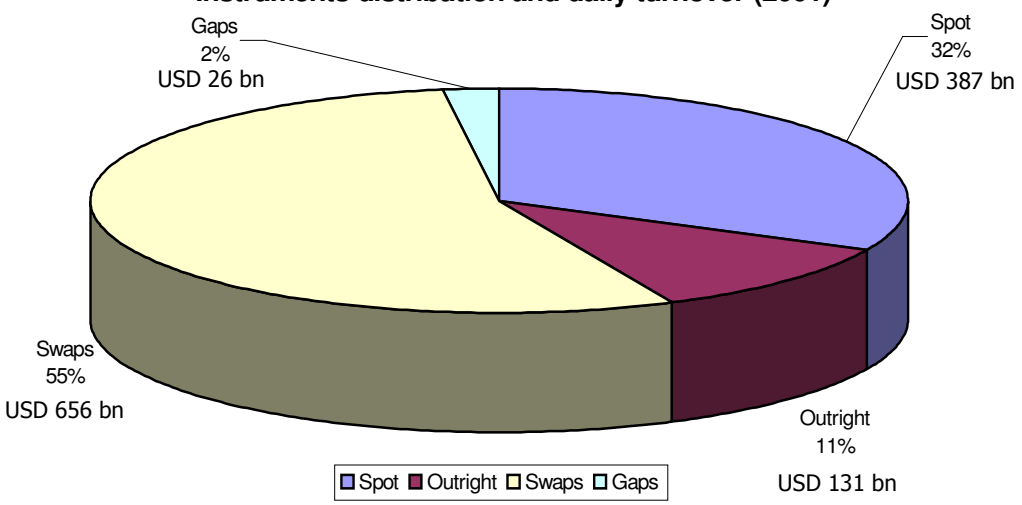
Foreign exchange markets can be separated along two dimensions. First, the market can be divided into markets for currency and markets for derivatives (e.g. options and certificates). Second, both currency and derivative markets can be split up further along the maturity of the traded instruments.

The most basic instrument is the spot transaction. Buyer and seller of a currency pair agree on a price today with value date two banking days from today (CAD and HKD being the only exceptions with spot date only one banking day ahead). Spot prices are not subject to premiums for interest differentials.

A transaction with value date different from spot is called outright or outright forward. Outrights are well suited for hedging currency exposure: a Swiss importer may purchase goods from Germany that are invoiced in EUR, payable within 90 days. To eliminate the risk of a rise in the EUR against CHF in the meantime and provide a sound basis on which to set his prices, the importer buys the EUR required to pay the invoice in an outright transaction for delivery in three months; in other words, the importer fixes today the price he's going to pay within three months time, eliminating currency risk.

Foreign exchange swaps are the most traded instrument today with more than USD 650 billion daily turnover. A foreign exchange swap is a combination of a spot

purchase and a simultaneous outright sale (or vice versa) in a given currency. Foreign exchange swaps are used to hedge investments in a foreign currency: the spot purchase yields the capital to be invested, and the simultaneous forward sale hedges exchange risk.



Graph 2

Source: Bank for International Settlements (2001), Table B.1, pp. 5, and author's calculations.

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