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The currency denomination of exports — A questionnaire study ☆

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Abstract

We report survey results on the currency choice of a random sample of Swedish exporters. We find that for an overwhelming share of exports, the price, invoice and settlement currency is the same. The currency of the customer is the most used, with Swedish kronor and vehicle currencies accounting for approximately equal shares. Currency choice is similar for intra-firm and between-firm trade. We also find that negotiations are important for both the price and for the currency choice. A minority of firms use posted prices for their main exports — the median price adjustment for those firms is once per year.
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1. Introduction

Nominal rigidities are important for how various shocks are transmitted. The price of a typical good changes once every 4 to 12 months. This is true not only for prices to consumers but also for trade between firms.[1] For internationally traded goods we are concerned not only with the stickiness of prices but also *in which currency* they are sticky.[2] For

[1] See for instance Blinder et al. (1998), Bils and Klenow (2004), Dhyne et al. (2006), Nakamura and Steinsson (2006), or Gopinath and Rigobon (2006) for export and import prices.

[2] If prices are rigid in the importers' (local currency pricing) or exporters' (producer currency pricing) currency has a large impact on the international transmission of shocks in open economy macro models. The seminal contribution to the "new open economy macroeconomics" is Obstfeld and Rogoff (1995). Betts and Devereux (1996) were perhaps the first to analyze different price setting currencies in such a framework, see Devereux and Engel (2003) for a recent contribution to a by now large literature.

instance, Cook and Devereux (2006) argue that U.S. dollar pricing of exports by East Asian countries contributed importantly to the severity of the crisis in that region in the late 1990s.

What then are the facts regarding currency use in international trade? Is the same currency used for setting prices as for actual payment? The distinction is important, as the macroeconomic consequences of currency choice typically stem from pre-set prices while much of the empirical evidence on currency use in trade is based on the currency of payment.[3] Furthermore, are there marked differences in currency choice when exporting to an external customer compared to when exports are within a multinational firm? How do firm characteristics correlate with currency choice? The data used so far is not sufficiently detailed to answer these questions. In partial remedy, we formulated a questionnaire that was sent to a sample of Swedish exporting firms. Stratified random sampling, a high response rate (73%) and no systematic differences between respondents and non-respondents within strata all point to that the answers are informative of the population of Swedish exporters and not just of the respondents.

Arguably Sweden is an interesting setting to examine currency choice. It is a small industrialized economy with relatively diverse exports, both in terms of geography and industries.[4] Inflation is low, the Swedish krona floats against the major currencies and does not have a special standing as international currency. Let us briefly present the previous theoretical and empirical literature before turning to our study.

We can envision a typical timeline for an international transaction as follows: Price is first set in some currency, at some later point an invoice is written and finally payment is made.[5] Transactions costs and exchange rate variability can affect the currency choice at all these stages. Some theory examines the pre-set pricing aspect (see Baron, 1976; Donnenfeld and Zilcha, 1991; Friberg, 1998; Bacchetta and van Wincoop, 2005; Engel, 2006a). In these papers the exporter decides on the currency in which to set her price and the central mechanism is the interaction between the curvature of the exporter's profit function and exchange rate variability. Other studies focus on the choice of currency for the invoice — see for instance Viaene and de Vries (1992). In their set-up, with risk aversion and exogenous prices and quantities, each party prefers to use her own currency and relative bargaining power will determine the outcome. Lastly, some papers focus on medium of exchange considerations. Rey (2001), for instance, shows how network effects can lead to low transaction costs for a vehicle currency (a currency other than that of the exporter or importer).

Empirical analysis has been hampered by a lack of detailed data on invoicing choices: For a long time our knowledge was built on snapshots of aggregate data, casual empiricism (for instance noting that oil is traded in U.S. dollars) and some limited surveys. Based on these sources a number of "stylized facts" are often recognized (see for instance Hartmann, 1998, p. 98): Primary products are generally priced in an international currency, typically U.S. dollars. Further, following Grassman's (1973) study of Swedish trade, a common finding is that trade in manufactured goods between industrialized countries is denominated in the exporter's currency. Important exceptions to this rule are that many Asian countries, as well as the U.S., mainly use U.S. dollars for both imports and exports. High inflation currencies are used less, and in trade between industrial and developing countries the developing country's currency is typically not used.

Only recently has sufficiently rich data been assembled to allow econometric analysis. Goldberg and Tille (2006) analyze the shares of exports and imports that are denominated in the own currency or U.S. dollars for a cross-section of 24 countries. They show the wide spread use of the U.S. dollar as a vehicle currency and for denominating trade in goods where firms have little price setting power. Kamps (2006) analyzes similar data for an unbalanced panel of 45 countries and documents an increasing role of the euro.[6] A handful of studies use detailed panels from one country (Canadian imports in Donnenfeld and Haug, 2003; Swedish exports in Wilander, 2006 and Swedish imports in Hopkins, 2006; Dutch trade in Ligthart and da Silva, 2007; Japanese trade in Oi et al., 2004 and Sato, 2003). Overall these micro studies confirm the previously mentioned "stylized facts".

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[3] See Goldberg and Tille (2006) for a discussion of the data. On the potential differences see Engel (2007, p. 6) "…in the model, the price is set in some currency and cannot change (presumably for some time) when there are shocks. Is this the same thing as the currency of invoicing? Can't a firm set its price in dollars but write its invoice in euros? Is there any evidence that this does not happen very much?"

[4] In 2005 the euro area accounted for slightly less than 50% of Swedish exports of goods, other European countries for an additional 20% and the U.S. for around 10%. Manufactured products make up about 50% of exports of goods (out of which 14% is transport equipment). Raw material based exports are also important, forest products and minerals each account for about 10% of exports. Source: Statistics Sweden.

[5] For trade between firms there is typically a lag of 30 days or more from the date of the invoice to the settlement (see Ng et al., 1999 for evidence on the extent of such trade credit).

[6] Novy (2006) also uses a cross-section of country level data. His model focuses on the matching motive for currency choice — to limit exposure firms may choose to have exports denominated in the same currency as imports. His results are consistent with this mechanism exerting some influence.

Table 1
The population of exporters of goods from Sweden and the sample

Exporters of goods from Sweden	Number of firms	Share of total export of goods (percent)
Swedish firms that Export goods for between 0 and 20 million Swedish kronor (Oct 2004–Oct 2005)	30,621	4.7
Foreign legal entities	37	2.0
Governmental entities	10	1.0
Firms not active in November 2005	159	3.7
Population from which sample is drawn	2540	88.6
All firms with exports of goods based on foreign trade statistics for 2004/2005	33,367	100

The sample	Number of firms in stratum	Share of total export of goods (percent)	Number of firms in sample	Responding firms (response rate)
Large exporters	50	52.3	50	42 (84%)
Medium exporters	211	23.9	150	109 (73%)
Minor exporters	2279	23.8	150	105 (70%)

The table documents the population of Swedish exporters for the period October 2004 to October 2005 as well as some details on the stratified sample that forms the basis for this study. Sampling was random within each stratum and done by Statistics Sweden, who also administered the questionnaire which was sent by mail in January 2006.

In the next section we present the survey in brief. In Section 3 we present results on currency use by Swedish exporters. In Section 4 we present answers on the details of the choices for price setting and invoicing. Section 5 links currency choice to firm characteristics and Section 6 explores the role of negotiations. Section 7 studies the frequency of price updates and Section 8 concludes.

2. The survey

The questionnaire was sent out by mail in January 2006 by Statistics Sweden. The sample is a random draw from the (stratified) population of Swedish exporting firms (we set a lower threshold at firms which exported goods for a total value of 20 million Swedish kronor in the preceding year: About 2.2 million euro or 2.7 million U.S. dollars). Table 1 above gives details on the population, the sample and response rates. The population from which the sample is drawn accounts for almost 90% of Swedish exports of goods. Exports are highly concentrated and the 50 largest exporters account for more than 50% of the exports of the population. These firms are all included in the sample. In the medium and minor classes of exporters firms are selected by random draws (Statistics Sweden did this and also ensured that the sample is representative with respect to different industries).

For each firm we know industry classification (5-digit level), exports as a share of revenue in 2005, turnover from exports for 2005, as well as the percentage of export revenue that accrued from the E.U. (including Norway, Iceland and Switzerland), North America (Canada, Mexico, U.S.) and the rest of the world. As seen in Table 2 we find no evidence of systematic differences between respondents and non-respondents for these background characteristics (t-tests do not reject that means are equal). Export earnings are a large share of overall earnings and the E.U. is the most important export market. In part B of Table 2 we document some self-reported characteristics of firms. Only a few firms classify themselves as independents. Foreign ownership is substantial across all size classes. The low share of firms that classify themselves as parents may reflect that many Swedish firms are partially owned by industrial holding companies.[7] Intra-firm exports account for between a third and half of export sales for the firms that do export to other firms in the same company group. Of the total export revenue for our sample, 40% is accounted for by intra-firm sales.

In the following we report results mainly to reflect the behavior of a representative firm in the population. To do this we weigh results by the probability of being sampled, which differs across strata. Letting N_h denote the number of firms in stratum h and n_h the number of sampled firms in stratum h we weigh responses by N_h/n_h. In addition we adjust for non-response by weighting by n_h/r_h (r_h denotes the number of firms in stratum h that returned the questionnaire). Our sample weights are thus given by $w_h = N_h/r_h$. The behavior of large exporters may differ from that of smaller exporters

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[7] A prominent example would for instance be Investor, www.investorab.com.

Table 2
Some means across different groups

Stratum, size of exporters	Large (responded)	Large (non-response)	Medium (responded)	Medium (non-response)	Minor (responded)	Minor (non-response)
Part A. Some characteristics across respondents and non-respondents						
Export share (turnover from exports/total turnover)	76.19	80.40	70.16	64.49	54.23	48.10
Export share to Europe	66.34	65.97	71.42	72.68	79.92	86.27
Exp share to North America	12.96	19.55	8.77	9.60	6.38	4.22
Exp share other	20.69	14.46	19.81	17.72	13.70	9.51
Part B. Some self-reported characteristics						
Parent	14.28	n.a.	11.11	n.a.	18.27	n.a.
Subsidiary of foreign firm	38.09	n.a.	48.14	n.a.	32.69	n.a.
Subsidiary of Swedish firm	45.24	n.a.	38.89	n.a.	39.42	n.a.
Independent	2.38	n.a.	1.85	n.a.	9.62	n.a.
Intra-firm exports (if larger than zero)	41.27	n.a.	53.66	n.a.	35.21	n.a.

Columns give means across different strata. Sampling is random within strata (apart from large where all firms are sampled). Using t-tests we can in no case above reject that at the 5% level of significance the means are equal for respondents and non-respondents for the alternatives within each size class. For instance, we cannot reject that mean export share for large respondents is equal to the mean export share for large non-respondents.

and we also report results where we weigh responses from each firm i by w_h*(turnover from exports for firm i in 2005). We now turn to the presentation of results.

3. Which currencies are used?

3.1. Is the same currency used for all stages?

We ask if the same currency is used for setting the price and in the invoice, and if the currency in the invoice is the same as the settlement currency. Firms are asked to answer for exports to customers that are not part of the same company group.[8] The first column in Table 3 reports the estimated proportion of Swedish exporters that follow a particular practice, using the weights discussed in the previous section. The second column gives the standard error of this estimate and the third column gives the responses weighted by both sample weights and export turnover. These answers should give a good picture of the importance of different practices for the value of Swedish exports. The last three columns give the proportions across the strata. In all cases we have denoted with a * the alternatives where a two-sided (survey adjusted) t-test rejects that a particular answer is equal to the alternative immediately below.

The estimated proportion of Swedish exporters that use the same currency for price setting and invoicing for *all* their export revenue from third parties is 63%. A further 24% use the same currency for 90–99% of export revenue. Generally differences across strata in this respect are small, although some differences are statistically significant.

In an open ended question we also ask firms why the invoicing currency can differ from the price setting currency. Two thirds of the 29 comments are some version of "request from the customer". Three respondents note that for their products the market set-up is such that the price is quoted in another currency — one firm for instance stated that the market price is set in U.S. dollars but the invoice denominated in euros to European customers. The remaining explanations are that "this is sometimes done for firms that are part of a company group but located in another country than the parent" (two answers) and one answer each for "netting against the import currencies that we have", "this may happen when trading houses are used as intermediaries", and "someone orders but then transfers the right to purchase which results in changes to the currency of invoice".

We now turn to the second stage of a typical transaction; is the same currency used for the invoice and for the settlement? An estimated proportion of 68% of Swedish exporters receive payment in the same currency as the currency of invoice for all (100%) the export revenue, and a further 24% receive payment in the same currency for 90–99% of their export revenue. Again, there are only minor differences across strata.

There are 19 firms that comment on why the settlement currency can differ from the currency of the invoice. Eight of these comments are different versions of customer requests (example: "the customer decides which currency to use,

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[8] In an appendix available at www.hhs.se/personal/Friberg we explore some issues regarding the currency choice of trade within the company group.

Table 3
Is the same currency used for price setting, invoicing and payment for exports to third parties?

Question in survey	Estimated proportion in population of Swedish exporters	Std. err.	Estimated proportion, value weighted	Proportion, largest exporters	Proportion, medium exporters	Proportion, small exporters
For how large a share of revenue [from exports to third parties] is the invoice denominated in the same currency as price was set in?						
100% of revenue	62.72*	4.24	57.08*	61.90	51.38♣	63.81♣
90–99% of revenue	24.18*	3.76	32.82*	30.95	26.61	23.81
70–89% of revenue	5.12*	1.89	2.96	0♣♠	10.10♣	4.76♠
50–69% of revenue	1.26	0.87	2.97	4.76	3.67	0.95
0–49% of revenue	3.57	1.68	1.14	0♣	1.83	3.81♣
For how large a share of revenue [from exports to third parties] is the payment denominated in the same currency as the invoice?						
100% of revenue	68.43*	4.07	65.75*	64.29	57.80♣	69.52♣
90–99% of revenue	23.81*	3.71	29.70*	35.71	31.19	22.86
70–89% of revenue	4.42	1.87	1.46	0♣	1.83	4.76♣
50–69% of revenue	.08	.07	0.13	0	0.91	0
0–49% of revenue	.10	.11	0.77	0	1.83	0

The first column reports the estimated proportion of Swedish exporters that correspond to the different alternatives and the second the corresponding standard errors. These results are weighted by sample weights. The third column is weighted by sample weights and the turnover from exports. A * denotes that a *t*-test rejects the null that the proportion is equal to the proportion directly below at the 5% level. ♣♠ indicate that we could reject the null that proportions are equal across strata at the 10% level. For instance, referring to the first row we can reject that proportion for small exporters equals that for medium exporters but not that either of them equals the proportion for large exporters. Shares do not sum to 100 since some firms that responded to the questionnaire did not respond to these particular questions.

sometimes after checking the exchange rate with us"). Seven of the comments say that when this happens it is because of mistakes or misunderstandings between the customer and the banks. Three mention supply problems: Customers in developing countries sometimes have problems in getting hold of Swedish kronor. One firm states that small orders that are invoiced in Swedish kronor are paid in euros.

The share of firms that answer 100% in both the questions above is 48% and a further 34% respond that at least 90% of revenue is denominated in the same currency for all stages of the transaction. One may worry that this result is driven by that Swedish firms mainly export to the euro area and to North America. The result is more general than that however — if we for instance restrict attention to firms that have at least 50% of their export revenue from the rest of the world the shares using the same currency are similar as those reported in Table 3.[9] We therefore conclude

Result 1: For an overwhelming share of exports [to third parties] the price, the invoice and settlement are denominated in the same currency.

3.2. What currency is used?

We are also interested in *what* currency that is used and therefore ask for the main currency of the firm's exports.[10] Starting with exports to firms that are not part of the same company group we see in Table 4 that the customer's currency is the main alternative for an estimated 42% of Swedish exporters (55% in value weighted terms).[11] The higher share of the customer's currency in value weighted terms reflects that smaller firms are more likely to use kronor for exports. Using *t*-tests we can reject (at the 5% level) that the shares of the customer's currency is equal to any of the other shares but not that share of kronor and the share of vehicle currency are equal.

In the empirical studies of currency use that we are aware of one cannot distinguish intra-firm trade transactions from trade between firms. The allocative role of prices is clearly much weaker within firms than across firms.[12]

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[9] Of these firms 66.67% (19.05%) use the same currency for price setting and invoicing for 100% (90–99%) of revenue. 57.14% (33.33%) use the same currency for invoicing and settlement for 100% (90–99%) of revenue.

[10] Until 2002 Sveriges Riksbank collected data on settlement currency. These were not published however and it has not been possible to get access to data for a broader range of industries than the subset which Wilander (2006) studies.

[11] Grassman (1973) found that Swedish exports were mainly invoiced in Swedish kronor. Given the substantial changes in institutional background since Grassman's study it is not surprising that behavior appears to have changed.

[12] There are a number of interesting issues regarding transfer pricing within multinationals and how they respond to taxes and other incentives — Bernard et al. (2006) use rich U.S. data and analyze transfer pricing issues in detail.

Table 4
What currency is used for international trade?

Question in survey: What currency is your main currency for exports? Mark the alternative that corresponds the closest in the respective case.	Estimated proportion in population of Swedish exporters	Std. err.	Estimated proportion, value weighted
For exports to other firms external to our company group			
The customer's currency	42.10*	4.45	55.16*
Swedish kronor	26.24	4.05	15.76
Other currency	23.59*	3.81	24.24*
We do not have a main currency for exports	3.87	1.77	2.00
Not applicable	4.20	1.78	2.83
For exports to other firms within our company group			
The customer's currency	50.76*	4.84	64.54*
Swedish kronor	25.68*	4.30	11.12
Other currency	5.61	2.07	10.70*
We do not have a main currency for exports	2.36*	1.47	1.46*
Not applicable	15.59	3.59	12.16*

The first column reports the estimated proportion of Swedish exporters that correspond to the different alternatives. These results are weighted by sample weights. The third column is weighted by sample weights and the turnover from exports. A * denotes that a *t*-test rejects the null that the proportion is equal to the proportion directly below at the 5% level. Shares do not sum to 100 since some firms that responded to the questionnaire did not respond to these particular questions.

So, for intra-firm trade the currency choice should matter much less for the links between exchange rates and real variables. If there are large differences in practices within and across firms this will weaken any conclusion that we try to draw from observed currency shares. We find that the customer's currency is by a large margin the main currency for exports also within firms, as reported in the lower part of Table 4.

Result 2: The currency of the customer is the most used, both for trade within and across company groups. The biggest difference between intra- and across firm currency use is that vehicle currency is used less in intra-firm trade, with the customers' currency taking on a slightly larger role. We can reject that the currency shares of the customers' currency (at the 10% level) and of a vehicle currency (at the 1% level) are equal for extra- vs intra-firm trade. However, when weighting observations by turnover, only the vehicle currency shares are significantly different. A *t*-test cannot reject that the share of kronor is the same for intra- and extra firm trade. Taken as a whole, currency use in intra-firm trade is not very different from that of external trade. We can therefore expect the available evidence on currency distribution in trade to give a good picture of arms-length trade — despite that approximately a third of world trade is within firms (see for instance Antràs, 2003).

4. What factors are deemed important for the currency choice of the representative firm?

A number of questionnaires have explored the costs of adjusting domestic prices (see Blinder et al., 1998; Fabiani et al., 2006). Inspired by this literature we ask about different considerations for currency choice. Firms answer to what extent a number of statements agree with their reasoning. The scale runs from "corresponds very well" (coded as 4) to "does not correspond at all" (coded as 1). In Tables 5 and 6 below we report the mean rank that different statements are given. To save space we group together related results and organize our discussion by contrasting the explanations that are given a higher mean rank in the population (significantly above rank 2) to those that are not (significantly below 2). For ease of reference the different alternatives are identified by 5.a, 5.b and so forth.

4.1. Factors that are given a high mean rank by the representative firm

"We decide the price setting currency ourselves" (5.a) and "we decide the invoicing currency ourselves" (6.b) are both given a high mean rank. The literature on currency choice almost exclusively models it as a decision by the exporter, so this finding can be viewed as support of that. On the other hand, the highest rank overall is given to "the invoicing currency is determined in negotiations with the customer" (6.a). Firms that answered affirmative on "we

Table 5
The importance of various factors for the choice of price setting currency

Question in survey: Answer how well each of the following statements corresponds to your company's choice of price setting currency	Mean rank (in population of exporters)	Std. err.	Mean rank (weighted by export turnover)	Mean rank, largest exporters	Mean rank, medium exporters	Mean rank, small exporters
5.a) We decide the price setting currency ourselves.	2.83*	.090	2.63*	2.44*	2.62*	2.86*
5.b) To limit the risk of price deviations between countries we use a limited number of price setting currencies.	2.73*	.101	2.49*	2.23	2.62*	2.76*
5.c) For large export markets price is set in the currency of the customer	2.62*	.108	2.89*	3.03*	3.11*	2.57*
5.d) Our choice of price setting currency is determined more by who the customer is than in which country the customer is based.	2.27*	.102	2.27*	2.21	2.45*	2.25*
5.e) We use the same price setting currency for our exports that our imports are invoiced in	1.87	.092	1.73*	1.55*	1.73*	1.89
5.f) We adapt our price setting currency following the choice of price setting currency that our competitors use	1.82*	.087	2.24	2.09	2.27*	1.78*
5.g) Our price setting currency is always Swedish kronor	1.69*	.102	1.35*	1.32*	1.27*	1.74*

The rank is calculated as the mean (weighted) where the alternatives are "Corresponds very well" (coded as 4), "Corresponds rather well" (coded as 3), "Corresponds less well" (coded as 2), "Does not correspond at all" (coded as 1). * indicates that a two-sided Wald test rejects that the mean rank for the corresponding alternative differs from 2 ("corresponds less well") at the 5% level of significance.

decide the invoicing currency ourselves" tended to answer slightly less affirmative on "the invoicing currency is determined in negotiations" (correlation of −0.18) but many firms attached some importance to both these answers, which is a bit puzzling. Our interpretation is that while ultimately it is the exporter, and not the importer, that has discretion over the offer price (and the currency in which it is expressed), invoicing currency is a factor that many firms

Table 6
The importance of various factors for the choice of invoicing currency

Question in survey: Answer how well each of the following statements corresponds to your company's choice of invoicing currency	Mean rank (in population of exporters)	Std. err.	Mean rank (weighted by export turnover)	Mean rank, largest exporters	Mean rank, medium exporters	Mean rank, small exporters
6.a) The invoicing currency is determined in negotiations with the customer	3.03*	.087	3.14*	3.12*	3.10*	3.02*
6.b) We decide the invoicing currency ourselves	2.81*	.102	2.37*	2.37*	2.48*	2.86*
6.c) Our firm has an explicit policy for how the invoicing currency is to be chosen	2.74*	.087	3.09*	2.98*	2.95*	2.71*
6.d) For large orders we invoice in the currency of the customer	2.30*	.102	2.63*	2.76*	2.5*	2.27*
6.e) We adapt to the invoicing currency that our competitors use	1.83	.086	2.18	2.05	2.07	1.81*
6.f) The expected development of the exchange rate affects the choice of invoicing currency	1.71*	.07	1.57*	1.52*	1.65*	1.72*
6.g) Fees of exchanging currency affect the choice of invoicing currency	1.69*	.065	1.65*	1.43*	1.79*	1.69*
6.h) The set of financial instruments that are available for a particular currency affect our choice of invoicing currency	1.64*	.071	1.81	1.71*	1.86	1.61*
6.i) If we use Swedish kronor as invoicing currency the customers demand compensation (for instance in the form of a lower price)	1.63*	.066	1.68*	1.82	1.75*	1.62*

The rank is calculated as the mean (weighted) where the alternatives are "Corresponds very well" (coded as 4), "Corresponds rather well" (coded as 3), "Corresponds less well" (coded as 2), "Does not correspond at all" (coded as 1). * indicates that a two-sided Wald test rejects that the mean rank for the corresponding alternative differs from 2 ("corresponds less well") at the 5% level of significance.

negotiate over. Indeed, the modal answer to the "currency is decided in negotiations" is that it fits "very well".[13] The conclusion we draw is that,

Result 3. The invoicing currency is largely determined in negotiations (6.a). This is a quite striking result and we return to analyze it in detail in Section 6. Continuing with the factors important for currency choice we find substantial weight given to:

Result 4. To limit the risk of price deviations across countries a limited set of currencies are used for setting price (5.b). Pre-set prices in several currencies, coupled with fluctuating exchange rates, opens up for customers always choosing the cheapest price which could hurt profits. Indeed this explanation is given some weight. An implication is that, while using the customer's currency is the main alternative for many firms, we should not expect this for small markets for firms that sell in many markets.

Result 5. Large export markets (5.c) and large orders (6.d) make it more likely that the customer's currency is used. Large markets tend to have their currency used for imports to a greater extent (see for instance Hartmann, 1998). There can be many explanations for this — it may for instance be that in a larger market more of your competitors are local (which would promote price setting in the importers' currency in a typical set-up with pre-set prices), that importers in a larger market are on average larger and have a stronger bargaining position (which would push in the direction of the importers' currency in the bargaining model of Viaene and de Vries, 1992) or that a larger market offers lower transaction costs and less of a role for vehicle currencies. Another potential explanation is that there are costs of setting prices in (and handling) additional currencies. Engel (2007, p 4) conjectures that the cost of setting prices in different currencies "must be one of the most important determinants of the currency of pricing". If there are fixed costs of setting prices in a particular currency a firm would be more willing to incur that cost for a large market. Similarly if there are partly fixed costs of invoicing in an additional currency the exporter would be more willing to do so the larger the order. Both these predictions are supported by the responses.

This also indicates that a firm may have different currency practices for different customers. Indeed, the statement "our price of price setting currency is determined more by who the customer is than in which country the customer is based" is given a mean rank slightly above 2 (5.d). Finally, a mean rank above 2 is also given the statement that firms have an explicit policy for how the invoicing currency shall be chosen (6.c).

4.2. Explanations that are given a low mean rank by the representative firm

Result 6. The currency choice of competitors is not a central concern for most firms (5.f and 6.e). This is to us a surprising finding. The desire to limit involuntary price variation with respect to the prices of competitors is intuitively appealing and figures prominently in the theoretical literature (see for instance Bacchetta and van Wincoop, 2005; Goldberg and Tille, 2006). Empirically there is also some support for it. Wilander (2006) finds that the larger the market share of U.S. exporters in a particular destination, the more likely is it that Swedish exporters receive payment in dollars from that market. Goldberg and Tille (2006) find that the larger the share of a country's exports that are traded on organized exchanges or reference priced (using Rauch's, 1999 classification) the more are U.S. dollars used for export invoicing, after controlling for other factors. In our survey the relatively low mean rank does hide considerable variation. At the 75th percentile the respondents answer that the statement [invoicing currency choice of competitors is important] corresponds "rather well" and at the 95th percentile "very well", with a similar pattern for price setting currency. The correlation between the answers to these two questions is 0.63.

Thus, it is not warranted to discard this explanation based on the low mean rank in this survey, but it does open up for that its importance is largely limited to firms faced with intense competition.

Result 7. The expected development of the exchange rate matters little for currency choice (6.f). A firm that has beliefs about appreciation of a particular currency would wish to use that as a store of value.[14] If currency markets are reasonably efficient there is of course little reason for a firm to expect that this kind of speculation is profitable. Indeed, on average the statement that the expected development of exchange rates influences the choice of invoicing currency is given a low rank.

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[13] In contrast, the answers to "we decide ourselves" largely fall on "rather well" or "less well" — a pattern that we might expect if our interpretation is correct. The proportions are: "we decide the invoicing currency ourselves" ("invoicing currency determined in negotiations") "not at all":13.92% (9.28%), "less well" 31.64% (13.92%), "rather well" 37.55% (38.0%) and "very well" 16.46% (38.82%).

[14] See Magee and Rao (1980) for a discussion.

Result 8. The set of financial instruments available in a currency and costs of exchanging currency are not deemed to be important for the currency choice (6.g and 6.h). This finding is also at first somewhat surprising. Choosing currency to limit transaction costs is one of the first mechanisms that economists theorized about (see for instance McKinnon, 1979). However, Swedish exports overwhelmingly go to the E.U., the U.S. or other jurisdictions with rather well developed financial markets and liquid currencies. It is plausible that transaction costs differences across different currency choices here are low enough to take the back seat. Again, for a subset of firms these issues are important. The 90th percentile firm responds that the statements regarding the importance of financial markets and transaction costs correspond "rather well" and six firms find that these statements correspond "very well" to their situation. For exports to developing countries these issues may indeed figure prominently: Wilander (2006) finds that across 69 Swedish export destinations less developed financial markets makes it more likely that a vehicle currency is used.

A caveat is also in order. The literature on the medium of exchange role of currencies shows that small differences in transaction costs can have large volume effects. Portes and Rey (1998) for instance stress transaction cost differences for the prospects of the euro to replace the U.S. dollar as the leading international currency. Therefore the distinction between *forex* vehicle and *trade* vehicle is important. To clarify consider the following case: A Swedish exporter and a U.K. importer agree to use Swedish kronor for the transaction. The Swedish firm receives Swedish kronor into its account on the settlement date. This would be reported as the exporter's currency being used in our questionnaire. The U.K. firm's bank may of course buy kronor directly by exchanging pounds Sterling for Swedish kronor or use the euro as a *forex* vehicle currency (see Hartmann, 1998 for a discussion) for the inter-bank transfer of funds.

Result 9: If kronor is used the importer does not demand compensation (6.i). In casual conversation with firms it is often taken as given that firms prefer to deal in their own currency. Magee and Rao (1979) note that if firms are risk averse and forward markets are lacking then a firm would want compensation (for instance in terms of a lower price) for taking on exchange rate risk. To test this we ask firms "if we use Swedish kronor as invoicing currency the customer demands compensation". This alternative gets a low rank in the population. Again the mean masks some variation: 1% of firms find that the statement corresponds "very well" to the situation and 12% that it corresponds "rather well".

Two final results are that "our price setting is always Swedish kronor" gets a very low rank and that matching currency exposures by choosing the same currency for exports as for imports is not significantly different from corresponds "less well".

5. Currency choice — cross-sectional results

Our survey offers a number of potential covariates for the main currency for exports. In Table 7 we give descriptive statistics on the currency choices for firms with different characteristics before turning to regression analysis in Table 8. We focus on exports to other firms, but note that the patterns for internal trade are rather similar.

For reference the first row of Table 7 gives the proportions of firms that gave a particular currency as their main currency choice.[15] The following three rows give the proportion of firms within each of the strata that gave the particular response. The standout feature here is that smaller firms are more prone to use kronor. Turning to industries we see that for relatively homogenous product industries such as mineral extraction and paper, kronor has a very small share.[16] For industries producing more differentiated products, such as electrical and precision tools, the share of kronor is higher. The dominance for the importer's currency is partly driven by that much of Sweden's exports are to the E.U. and North America. Vehicle currency is the main alternative for around two thirds of the firms that have more than 50% of their exports to the rest of the world. Using Rauch's (1999) classification we see that kronor has a larger share among differentiated products, but it is the currency of choice also for some firms active in reference or exchange traded industries.[17] Lastly we split the responses according to whether the main export price is exogenously given,

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[15] For the external exports we thus exclude the 23 firms that answered "not applicable" to this question from the calculations of proportions. 12 of these answered 100% of their sales were intra-firm. For the remaining 11 it is not clear from their answers to other questions why the question was deemed not applicable.

[16] The respondents come from a total of 163 5-digit industries, categorized according to Swedish SNI-codes. At the 4-digit level this is identical to the European industry classification NACE Rev 1, the 5-digit level is specific for Sweden. Also at the 2-digit level most industries have only few firms and we therefore group related 2-digit industries, as documented in Tables 7 and 8.

[17] Rauch (1999) divides products into differentiated products, reference priced (for instance in trade journals) and prices that are set on competitive exchanges. We map Rauch's (1999) classification over goods into our industries (at the 5-digit level).

Table 7
Which currency is used for international trade?

Question in survey: What currency is your main currency for exports? Mark the alternative that corresponds the closest in the respective case									
	Exports to external customers					Exports within the company group				
	Swedish kronor	The customers currency	Vehicle currency	No main currency	Nobs	Swedish kronor	The customer's currency	Vehicle currency	No main currency	Nobs
All (not weighted)	18.88	49.78	27.89	3.43	233	21.72	64.14	11.62	2.52	198
Largest exp.	10	55	32.5	2.50	40	8.33	66.67	25	0	36
Medium exp.	12.37	54.64	29.90	3.09	97	18.68	67.03	10.98	3.30	91
Small exp.	29.17	42.71	23.96	4.17	96	32.29	59.15	5.63	2.82	71
Minerals	0	40	60	0	5	25	25	50	0	4
Paper and wood	10	80	6.67	3.33	30	27.27	59.09	13.64	0	22
Electrical and precision tools	27.27	27.27	45.45	0	22	28.57	52.38	19.05	0	21
Europe (>50%)	18.52	54.49	23.28	3.70	189	22.69	63.19	11.04	3.07	163
North Am. (>50%)	14.28	42.85	42.85	0	7	14.28	85.71	0	0	7
Other (>50%)	11.11	16.67	66.67	5.55	18	10	60	30	0	10
Differentiated	22.87	47.06	26.80	3.27	153	21.89	66.43	8.76	2.92	137
Reference	12.07	62.07	20.70	0	58	22.72	65.91	11.36	0	44
Exchange traded	4.77	38.09	57.14	0	21	13.33	46.67	40	0	16
Price taker	0	35.71	57.14	7.14	14	0	40	60	0	10
List price	22.67	42.67	33.33	1.33	75	18.57	74.28	7.14	0	70
Negotiated	18.37	55.10	22.45	4.08	147	26.31	60.53	10.53	2.63	114

The rows report the raw proportions in the data. Nobs is the number of firms for which the respective proportions are calculated, excludes firms that answer "not applicable". Largest, medium and small refer to strata. Minerals (NACE industries 11, 13 and 14), Paper and wood (NACE industries 20 and 21), Chemicals, Electrical and precision tools (NACE industries 30, 21, 32 and 33). Differentiated, reference and exchange traded builds on Rauch (1999). Price taker, list price and negotiated are self-reported.

negotiated or simply a list price (these are self-reported answers, see further discussion in Section 6). Firms that are price takers did not use kronor and used vehicle currency to a large extent. Clearly, a price taker has little or no possibility to have a price *set* in another currency than that of the market price. That vehicle currency tends to be used for denominating such trade has been noted at least since McKinnon (1979) and is also pointed to by Goldberg and Tille (2006). A closer look at the data reveals that the firms that are in exchange traded industries, but do not classify themselves as price takers, answer that the price of their main product is determined in negotiations. On the spot market there is no possibility to set a price different from the market price, but for a longer term contract there is clearly some leeway for discussing price.

In Table 8 we report regressions on the currency choice of firms. For many purposes the most interesting distinction is whether prices are set in the exporter's currency or in a foreign currency. As dependent variable we therefore use whether kronor is the main export currency (coded as 1), or not (coded as 0).

In our baseline specification, (1), we relate the currency choice to strata, whether the firm operates in a differentiated product industry, whether it is a subsidiary of a foreign firm and dummies for the main export market of the firm. We use a linear probability model, taking into account of that data come from a survey.[18] The smallest exporters are some 16% more likely to use kronor as their main currency. Firms selling differentiated products are some 21% more likely to use kronor. Destinations outside Europe are associated with a lower probability that kronor is used, but being a foreign subsidiary shows no relation with the use of kronor. Estimating the same regression with logit yields marginal effects that are very close to those in (1). A drawback of logit estimation on survey samples is that there is no measure of goodness-of-fit that is simple to interpret and generate. Recently, Archer and Lemeshow (2006) have proposed a test, and indeed using their test we cannot reject that the specification in column (2) provides a good fit for the data. The R-squared from a linear probability model is easier to interpret however and we use a linear probability model for the remaining columns.[19]

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[18] Specifically, we use svy: reg in STATA 9.

[19] We have also estimated all specifications with logit and marginal effects are in all cases close to the coefficients in the linear probability specifications.

Table 8
The main currency for exports is kronor

	(1) Linear prob.	(2) Logit	(3) Linear prob.	(4) Linear prob.	(5) Linear prob.	(6) Linear prob.	(7) Linear prob.
Dependent variable	Kronor main export currency=1	Kronor main export currency=1	Kronor main export currency=1	Kronor main export currency=1	Kronor main export currency=1	Kronor main export currency=1	Kronor *internal* export currency=1
Small exporter=1	0.158 (0.054)***	.157 (0.054)***	0.214 (0.064)***	0.121 (0.054)**	0.106 (0.054)*	0.093 (0.056)*	0.082 (0.057)
Large exporter=1	−0.003 (0.063)	−0.033 0.109	−0.001 (0.071)	−0.013 (0.064)	0.002 (0.062)	0.020 (0.062)	−0.078 (0.059)
Differentiated Product=1 (Rauch)	0.208 (0.074)***	0.201 (0.071)***	0.234 (0.072)***	0.222 (0.072)***	0.220 (0.070)***	0.173 (0.069)**	−0.040 (0.081)
Foreign daughter	−0.005 (0.081)	−0.004 (0.082)	0.028 (0.081)	−0.010 (0.080)	−0.013 (0.080)	0.027 (0.077)	0.119 (0.080)
>50% export to North America	−0.315 (0.067)***	−0.243 (0.043)***	−0.272 (0.073)***	−0.282 (0.141)**	−0.250 (0.113)**	−0.197 (0.151)	−0.204 (0.075)***
>50% export outside Europe and North America	−0.175 (0.103)*	−0.164 (.093)*	−0.155 (0.108)	−0.122 (0.110)	−0.128 (0.121)	−0.085 (0.127)	−0.240 (0.045)***
Industry effects			Yes				
>95% turnover from exports=1				−0.207 (0.067)***	−0.244 (0.069)***	−0.233 (0.074)***	
<22% turnover from exports=1				0.176 (0.113)	0.167 (0.109)	0.173 (0.105)	
Fx policy=1					−0.142 (0.079)*	−0.140 (0.078)*	
Decide price setting curr. self=1						0.215 (0.075)***	
Decide invoicing currency self=1						−0.048 (0.082)	
Invoicing curr negotiated=1						−0.137 (0.083)	
Constant	0.011 (0.072)		−0.129 (0.100)	0.020 (0.072)	0.092 (0.088)	0.120 (0.115)	0.159 (0.073)**
Observations	256	256	256	256	256	256	256
R-squared	0.08		0.11	0.13	0.15	0.21	0.05

All specifications use survey methods. Dependent variable coded as 1 if firms answer that kronor is the main currency for exports, 0 otherwise. This is for external exports in col (1)–col (6), exports to other firms within company group in col (7). Industry effects are dummies for Paper and wood (NACE industries 20 and 21), Chemicals (23,24 and 25), Machinery (27,28 and 29), Electrical and precision tools (30, 21, 32 and 33). Standard errors in parentheses. The last four variables (apart from the constant) codes answers from other questions in survey, coded as 1 if corresponds "very well" or "rather well". * significant at 10%; ** significant at 5%; *** significant at 1%.

In column (3) we add industry effects (grouping together 2-digit industries). These are not significant but the differentiated product dummy remains significant at slightly above 20%. These findings are consistent with theoretical models analyzing the pre-set pricing aspect: The drawback of using the exporter's currency when setting price stems from demand variability brought about by fluctuating exchange rates and pre-set prices. Since differentiated products are likely to have lower price elasticity of demand, this effect is muted. Within any industry at the two-digit level there is a large variation between how differentiated products are. The Rauch dummy picks up the product differentiation, while the rather broad industry effects do not. We conclude that:

Result 10: Firm that sell differentiated products are more likely to use kronor as their main currency for exports. In columns (4) and (5) we explore what gives rise to the higher prevalence of kronor for small exporters. One can hypothesize that there are perceived costs of dealing in foreign currency that are greater for small firms. Direct costs of exchange appear not to be the explanation however — the correlation between answers to the question about costs of currency exchange (6.g in Table 6) and the currency chosen are not significant. In column (4) we add dummy variables for the 10% of firms with the highest and lowest export-intensity, respectively. Our prior is that export-intensive firms, in our sample these are almost pure exporters with more than 95% of sales from exports, are more used to deal in foreign currency and therefore find it less costly to do so. This is confirmed, the most export intensive firms are some

21% less likely to use kronor as their main currency.[20] Column (5) adds a dummy that takes the value of one if the firm answered that it had a written policy for management of currency exposure. Firms that have a written policy on currency risk management are also less likely to use kronor, conceivably because standardized ways of dealing with currency risks reduce the costs associated of foreign currency use.[21] Overall, the finding that smaller exporters are more likely to use kronor is quite robust across specifications with point estimates ranging from some 10 to 20%. We conclude that:

Result 11: Smaller exporters are more likely to use kronor as their main currency for exports. One clue to understanding this result may be that small exporters are more likely to have smaller orders than are large exporters. Wilander (2006) documents that payments to Swedish firms denominated in kronor are on average smaller than payments in foreign currency. Similarly, the statement that large orders are more likely to be invoiced in the customer's currency is given a high mean rank (6.d in Table 6). Lest we over-interpret, we should point out that the customer's currency is the dominant choice also for smaller exporters.[22]

Column (6) also includes variables capturing "we decide the price setting currency ourselves", "we decide the invoicing currency ourselves" and "the invoicing currency is determined in negotiations with the customer". In all cases the corresponding dummy is coded as 1 if firms answer that the statements match their situation "rather well" or "very well" and 0 otherwise. In terms of interaction with the effect of being small, it may be the case that a larger counterparty has a lower cost of taking on exchange rate risk. Efficient bargaining would then lead to a larger role for kronor for the smaller firms. However, the marginal effect of being a small exporter is essentially unchanged when we include the variable capturing whether the invoicing currency is determined in negotiations. Answering that they decide on invoicing currency themselves has a small and insignificant association with choosing kronor, consistent with our discussion of this result (6.b in Table 6). Having invoicing determined in negotiations had a negative association with the use of kronor, the effect is large but not statistically significant at conventional levels. The variable capturing "we decide the price setting currency ourselves" is positive and statistically significant. The effect is large; such firms are 21% more likely to use kronor for exports.

Finally, column (7) runs the same specification as in column (1) but has kronor use for exports *within* the firm group as dependent variable. Explanatory power is lower and neither size nor product differentiation are significant. This points to that, even though the overall patterns of currency use are similar across and within firms, the mechanisms are different. Only the geographical effects remain. Since these are statistically significant in all specifications, they deserve to be commented upon. Firms that export more than 50% to the North America and firms that export more than 50% outside North America and Europe are less likely to use kronor. The first effect is probably due to the prevalence of dollar invoicing, the second due to vehicle currency use. That firms exporting mainly to European countries are more likely to use kronor is partly explained by the importance of Norway, Denmark and to some extent the Baltic states for Swedish trade, export destinations were use of kronor is common.

6. Negotiations

In standard models of price setting currency the exporter simply chooses the currency that maximizes her expected payoff, given the behavior of the importers and the competitive situation. As documented above however, the invoicing currency is largely determined in negotiations. We note that also the price itself, if not exogenously determined, may be set either by the producer or determined in negotiations with the customer. In the survey we ask what best describes the firm's pricing decision. Recognizing that firms sell many products, and that practices may differ across products, we

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[20] This result is dependent on how export-intensity is defined. We choose a cut-off at the 90th percentile in terms of export revenues as share of turnover. Lower cut-offs, or a continuous variable, lead to insignificant results. This points to that the effect is confined to almost pure exporting firms.

[21] Causality could also go the other way; only firms that use foreign currency for exports need to write policy guidelines on currency risk. However, that need not be true. An exporting firm is naturally exposed to risk regardless of the currency used for exports.

[22] As pointed out by a referee, if smaller firms have a weaker (bargaining) position and firms prefer to deal in their own currency then one would instead expect larger firms to use kronor more. However, while larger firms have a stronger bargaining position in some industries (see for instance Chipty and Snyder, 1999) this mechanism may fail to play a significant role in a limited cross-section with firms from many industries. Also, as discussed, preference for one's own currency is not an unconditional prediction from theory. Even so, a related puzzle might be that smaller firms use financial instruments to a lesser extent (see for instance Jin and Jorion, 2006). This is surprising since theoretical reasons for why firms should hedge exposures are particularly relevant for small firms.
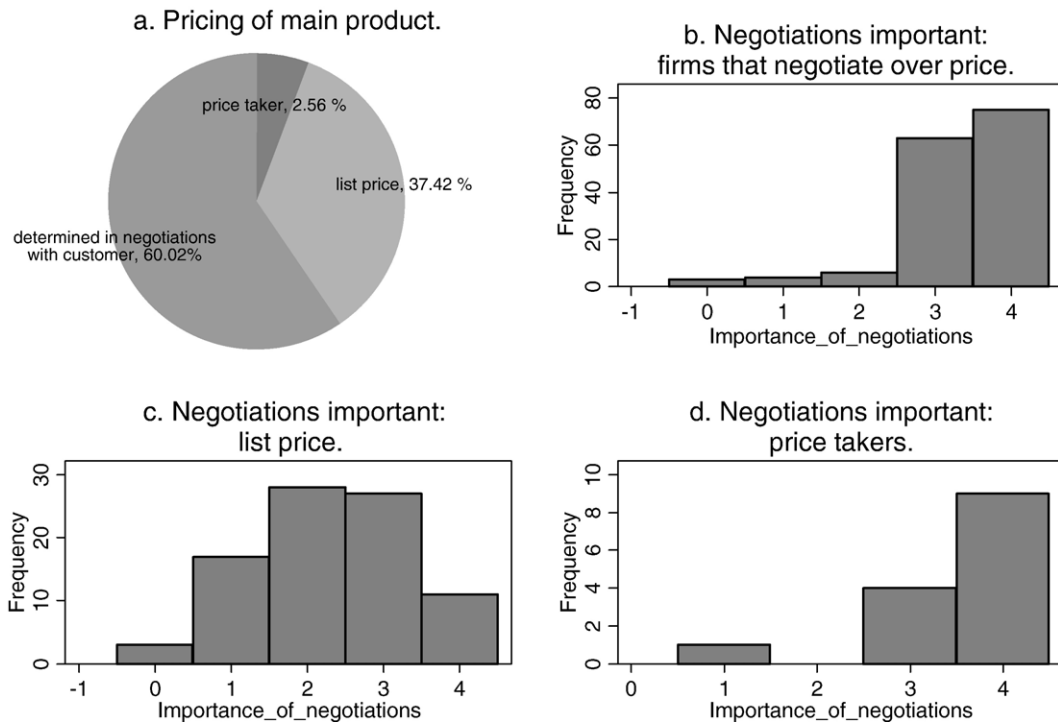
Fig. 1. a) Reports the weighted results from the question "Regarding your main product [for exports to third parties], what description matches the firm's price setting best?". b–d) Gives the frequency of answers to "The invoicing currency is determined in negotiations with the customer": corresponds "very well"=4, "rather well"=3, "less well=2", "not at all=1".

ask firms "Regarding your main product [for exports to third parties], what description matches the firm's price setting best?" As illustrated in Fig. 1a, the estimated proportion of firms that respond that price is determined in negotiations with the customer is 60%, 37% use list prices and 3% face an exogenously given price (for instance from a commodity exchange).[23] Thus, negotiations with importers are given a prominent role for both the price itself and for the currency in which this price is denominated on the invoice.

Not surprisingly, negotiations over the invoicing currency are important for firms that also negotiate over price as seen in Fig. 1b. If we limit attention to the firms that use a list price for their main product the distribution is much flatter.[24] It also notable that among the quite few firms that view themselves as price takers on their main product, negotiations over invoicing currency are nevertheless attached substantial weight.

The two models of bargaining over invoicing currency that we are aware of (Viaene and de Vries, 1992; Donnenfeld and Zilcha, 1995) are very stylized and without more theoretical work it is hard to foresee what robust predictions for currency use that bargaining models are going to generate. To empirically test such models we need information about both parties since *relative* bargaining strength is likely to be a crucial factor.

To explore potential covariates of bargaining Table 9 nevertheless reports the partial correlation of the variable indicating whether invoicing was determined in negotiations with the customer with strata effects, product differentiation, if firms negotiated over price and main export destination.[25] Product differentiation is negatively related to negotiating over invoicing, but the effect is weak. Neither export destination, nor firm size seems to determine if firms negotiate over invoicing currency if we control for that firms negotiate over price. However the decision to

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[23] The corresponding figures when weighted by export revenue are 61.81, 27.59 and 10.59.

[24] Nevertheless, the mean rank on "negotiating over invoicing currency" is 2.37 for this group, also significantly above 2.

[25] We also carried out a set of regressions but since the results did not differ much from the correlation analysis we report the latter to save on space. We also examined differences at the industry level. As indicated by histograms of the importance of negotiations available at www.hhs.se/personal/friberg there is considerable dispersion in the importance attached to negotiations also within the relatively narrow bins of 5-digit industries.

Table 9
The importance of negotiations for invoicing currency

Partial correlation of "invoicing currency is determined in negotiations with customer" with	
Small exporter=1	−0.0142
Large exporter=1	0.0352
Differentiated product=1 (Rauch's classification)	−0.1074*
Price determined in negotiations	0.4910***
>50% export to North America	−0.0040
>50% export outside Europe and North America	−0.0044

"Invoicing currency is determined in negotiations with customer" coded as 1 if corresponds "rather well" or "very well", zero otherwise. * significant at 10%; ** significant at 5%; *** significant at 1%.

negotiate over price is likely to at least partly be driven by the same factors that motivate negotiations over invoicing currency. We should therefore not view negotiations over price as exogenous to negotiations over currency and we merely note the strong association between the two sets of negotiations.

Result 12: Firms that negotiate over price are more likely to negotiate over invoicing currency as well.

7. How often are prices changed?

Many issues concerning the real impact of exchange rates revolve around price rigidities. If prices adjust frequently, the currency in which these prices are quoted in is likely to matter little for real prices and real profits. If a price is only updated yearly however, it is likely to be of considerable consequence. We ask the firms who respond that they use price lists to report how frequently they have changed the list price for their main product on their largest export market in the last 12 months. These are 86 firms and we present the raw proportions: No price change: 16.87%, 1 change: 49.38%, 2 changes: 13.25%, 3 changes: 3.61%, 4 changes: 6.02%, 5–8 changes: 1.2%, 9–12 changes: 2.4%, more than 12 changes: 2.4%.

Result 13. The median firm with a price list changes its price once per year. That the median firm adjusts its price once a year is in line with the survey evidence that focuses on domestic prices (Blinder et al., 1998; Apel et al., 2005; Fabiani et al., 2006).[26] It is also in line with one of the few studies that examine the stickiness of prices at the "docks": Gopinath and Rigobon (2006) find that the average U.S. export or import price each lasts about a year. One may have expected export prices to adjust more frequently than domestic prices given that the frictionless export prices are likely to be subject to greater shocks.[27]

Lastly, let us stress that, for more than half of Swedish exporters, the most important price is determined in negotiations with the customer. If prices are negotiated for every order prices are essentially flexible (in the sense that price and quantity are determined simultaneously, even though payment may be delayed because of trade credit). On the other hand, if prices are renegotiated yearly, and importers continuously decide what quantities to buy at these prices, the set-up is close to a standard price rigidity set-up. Based on results from a previous questionnaire, Apel et al. (2005), we expect both types of contracts to play a role in explaining the overall rigidity of export prices.[28]

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[26] It may also be noted that some of the studies of the micro data that underlie consumer price indexes point to the median price adjusting more frequently. Bils and Klenow (2004) report that the median price is adjusted every 4.3 months. Nakamura and Steinsson (2006) show that temporary sales are an important reason for the relatively frequent adjustment found by Bils and Klenow (2004). Using a similar, but broader, dataset Nakamura and Steinsson find that the median duration of prices, excluding sales, is between 8 and 11 months.

[27] Of course in a setting with state dependent pricing it may not necessarily be the case that prices adjust more frequently since the band of inaction will be a function of both the size and frequency of shocks — see Flodén and Wilander (2006) for an analysis. Using the survey responses we can compare the frequency of price adjustment for list prices across the different main currencies used (as reported in Table 4) but no clear links between the currency of denomination and the frequency of price adjustment stands out.

[28] That study also rested on stratified random sampling. If we analyze the answers from that survey and constrain attention to the firms where at least 70% of turnover came from exports we find that: For 64% of such firms the typical contract specifies both price and quantity, whereas for 27% the typical contract only specifies price. For 52% of the export intensive firms a typical contract specifies a price that lasts 7–12 months (16% less than 7 months, 20% 12–24 months and 4% more than 24 months). 29% of these export intensive firms stated that the price in the contract normally is linked to the consumer price index, an index of costs, or similar.

8. Conclusions

The same currency is used to denominate all three stages of a typical transaction in international trade (for Swedish exports). We view this as our main contribution. While the finding is intuitive, it is also important since it points to that we can use data on the settlement or invoicing currency to say something about the price setting currency and adjustment to shocks (as in for instance Goldberg, 2007). Another question mark in using settlement data to test predictions from models on currency choice has been the potential for differences in currency choice within and across firms. We show that currency choice is similar for trade within and across firms. When we relate currency choice to firm characteristics our two most important findings are that smaller firms and firms in differentiated product industries are more likely to use kronor.

The answers in the survey also point to that local currency pricing is the dominant practice among Swedish exporters. The results could thus be taken as a motivation for a local currency pricing assumption (LCP) in a new open economy macro model. Two caveats are in order: Firstly, three quarters of Swedish imports are denominated in foreign currency, so there is an important asymmetry in the currency use — Sweden mainly uses local currency for exports but Swedish imports largely use producer currency.[29] Secondly, the bulk of export prices are negotiated rather than simply pre-set by exporters. Indeed, an additional contribution is to document the large role of negotiations about prices and currency. We hope that our findings will spur more theoretical and empirical work on the role of negotiations for pricing of trade.

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[29] Hopkins (2006) analyzes currency use for Swedish imports. In 2002 40% of imports of goods were denominated in euro, 23.6% in U.S. dollars and 24.5% in kronor.

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