

GREASING THE WHEELS OF TRADE: A PROFILE OF THE DUTCH  
TRANSACTION SECTOR\*\*\*

BY

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*Summary*

How many resources does a nation spend on transactions costs to ‘grease the wheels of trade’? To examine this question the Dutch economy is used as a case study. The Netherlands are known as a nation of traders and this image was derived in the seventeenth century from successes in long distance trade, shipping and financial innovations. Despite its historical background the trading sector has never been adequately measured. In this paper, we present a first attempt in measuring and describing the Dutch transaction sector. Measurement by means of occupational data points out that approximately 25% of Dutch workers is employed in transaction jobs, and 29% if one includes transport tasks. We make the case that traditional industrial sector categories overestimate the true transaction character of an economy. Traditional ‘trade’ sectors employed 13% of the workers in 1807 and 39 percent in 1998, but these figures conceal the fact that all organizations employ jobs which have transformation and transaction tasks. A counterfactual exercise suggests that the growth of the transaction sector share in employment over two centuries was not 200% but 42%.

**Key words:** labor, trade, transaction costs

1 INTRODUCTION

Standard neoclassical models give the impression that trade, besides transport costs, is ‘a free lunch’. Arbitraging comparative advantages is a task involving no transaction costs whatsoever. Actual trade practices are far more complex and the theory about the microstructure of markets is slowly catching up with

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this element of everyday life.<sup>1</sup> Despite the widespread agreement that transaction costs matter, there is hardly any empirical work in this area. The reason why theory is ahead of empirical proof is to be traced to the fact that there is no standard terminology. The heterogeneity of transactions costs across individuals and groups within society is abundant and rarely transparent to outside observers and, it is inherently difficult to separate transactions costs from standard (national) accounts as production activities and transactions are jointly determined (Benham and Benham (2000)). Some even claim, like Niehans (1987, p. 677) that because of the complexity of most contracts “transaction costs become difficult, and perhaps impossible, to quantify.” Although measurements of transaction costs may be a scarce commodity in economics, economic historians have been very keen on unraveling the ‘fundamental problem of exchange’ (see Greif (2000)) and the same seems to apply to the attention historians pay to the case of the Netherlands. The extensive descriptions of Dutch trading endeavors before the turn of the nineteenth century by economic historians – like Landes (1998), de Vries and van der Woude (1997), North (1990) and Israel (1989) – are in marked contrast with the present day understanding of the alleged success story of Dutch international trade. Economic historians may perhaps not agree on what really is behind the ‘exceptional’ case of the Dutch economy (see, e.g. van Zanden (2002)), they do, however, recognize that making trade and designing markets is not a free lunch.

This paper offers a first attempt for the Netherlands in assessing the size and structure of the transactions sector of the present day. We pose three questions. First, how large is the size of the transaction sector? Second, what characterizes the typical transaction worker? And third, are we witnessing a dramatic increase in the size of the transaction sector? A Dutch occupational dataset forms our main source of analysis. We rely on this dataset as it offers the best opportunity for the Netherlands of gaining a detailed insight into tasks carried out inside organizations. In that sense, our approach differs from the traditional approach of assessing the transaction market as the aggregate of sectors that provide many transaction tasks.

The main results of this exercise for the Netherlands are first of all, that trade is not a costless affair and employs approximately 25% of the Dutch workforce in 1997, and 29% if one includes the transport sector. By comparing these figures from the figures obtained by looking at sectors instead of occupations, our approach finds a much smaller value. Secondly, on the issue of examining the personal characteristics of the transaction worker, it appears that transacting is not a task or job that requires high education levels or a profession that employs high level or scientific skills, the only exception is the case of trading information. In addition, we find traditional trade sectors

1 See, e.g., Rubinstein and Wolinsky (1987), Johri and Leach (2002), Spulber (1999), and Ellis (2000, 2001).

to employ many transaction workers, but contrary to the implicit assumption underlying traditional trade statistics, these sectors are not the only sectors to employ these workers. A noteworthy observation is that migrants are less likely to perform a transaction job. This stylized ‘fact’ contrasts strongly with the entrepreneurial status that immigrants had at the end of the nineteenth century in the Netherlands. Thirdly, based on the distribution of the number of workers tied to the different transactions sectors, one can show that over almost two centuries the transactions sector tripled in size: from 13% in 1807 to 39% in 1998. But an illustrative counterfactual based on the number and structure of transaction tasks across sectors of today suggests that this spectacular rise is far too high. Based on adjusted historical employment statistics the transaction sector increased from 19% in 1807 to 27% in 1998. Hence, careful calculation of the transaction sector makes clear that bringing about transactions is certainly not a free lunch. In addition, sector based statistics traditionally used in assessing the structure of an economy can be misleading when the focus is on transaction costs.

The remainder of the paper is setup as follows. In the next section, we provide details about our definition for the trade sector and we discuss our data set. In section 3, we discuss the results of our analysis to find the characteristics of a typical transaction worker. Section 4 is a separate section in which we analyze possible changes in the transaction sector over time. Section 5 provides conclusions.

## 2 MEASURING THE TRANSACTION SECTOR

We measure the transaction sector by looking at the number of individuals performing tasks that are explicitly directed at making market transactions possible. The reason for looking at occupational data and not some monetary measure of individual transactions is that one is left with an inherently difficult aggregation problem if one takes transaction costs of individuals as a starting point. As Benham and Benham (2000, p. 369) point out: “the law of one price does not apply in questions of transactions.” Each and every participant who carries out transactions faces different transaction costs – stemming from information, social networks, political connections, ethnicity, skill, etc. – and therefore one would need many estimates of these costs. Needless to say, in constructing measurements one has to make definitional choices of what constitutes the transaction sector. Measurement is however not without its usual definitional problems as the concept of transaction costs has led in the day-to-day practice of economists to a host of definitions and measurements (cf. Allen (2000)). In this paper, we perform a measurement exercise that has much in common with the Wallis and North (1986) study, although we focus on a more narrow definition of transactions. By registering all elements of the transaction function in the (Dutch) labor force

statistics<sup>2</sup> we obtain an estimate of the size of the transaction sector. Just like in Wallis and North (1986) we make a distinction between economic activities concerning the ‘transaction function’ and others that are primarily directed at the ‘transformation function’. *Transaction* costs are the costs associated with making market exchanges possible thereby reaping the benefits of comparative advantage. In the words of Wallis and North transaction costs would be the costs of performing the transaction function and *transformation* costs are those costs tied to transforming inputs into outputs. Both these activities are ‘productive’ in that each activity is only performed if the expected benefits of doing so exceed the expected costs. But there are also some two major differences between their study and ours: (1) the inclusion/exclusion of internal firm transactions; and (2) the measurement unit and method.

To start with the first difference, in their view the firm is a bundle of contracts and within the firm there exists a sequential series of contracts, between owners and managers, between managers and supervisors, and between supervisors and workers. The focus of the present paper is explicitly oriented towards the organization surrounding the exchange of goods and services and *not* the transaction costs tied to principal–agent relations *within* an organization. In short, we focus on the make-or-buy distinction introduced by Coase (1937): the relative costs of markets and organizations are viewed as the main determinants of the extent of the firm’s activities. Our focus is on the costs of using markets, i.e. transaction costs. Activities or tasks that occur inside the walls of organizations that are directed at the coordination of *transformation* activities (like management tasks), are therefore excluded from our exercise. Our aim is to remain close to the task of bringing about *market* transactions. The inclusion of internal firm transactions would entail numerous arbitrary choices of defining a task as transformation or transaction.

The second difference refers to the measurement unit and method. Wallis and North follow a two-step procedure. They first divide industries into (1) industries that produce primarily non-transaction goods and services and (2) pure transaction industries. The latter category consists primarily of intermediaries that provide transaction services. In their view, the resources used in finance, insurance, real estate, wholesale and retail trade constitute the so-called ‘transaction industry’. For the non-transaction industries they try to measure the transaction part of those industries by dividing professions into transaction and transformation professions. Our exercise differs by using a more detailed unit of measurement – job tasks instead of professions – and we look at each and every person employed in the economy, in transaction as well as non-transaction industries.

2 The Standard Occupations Classification (SCO) of Statistics Netherlands (2001) is to some extent related to the ISCO (International Standard Classification of Occupations) 1988 (see [www.ilo.org](http://www.ilo.org)) but the level of detail of the SCO is far higher and makes it possible to distinguish jobs that come close to our definitions of trading jobs.

There are two developments in the dynamics of firm behavior that need to be mentioned at this point as they could affect the size of the transaction sector over time. These developments could also potentially explain differences in measurement results between the Wallis and North and this paper. The two developments refer to the phenomena of (1) integration and mergers, and (2) outsourcing. By merging firms and establishing some form of (vertical) integration the scope for saving on transaction costs could be quite substantial as firms need no longer bargain over prices or contracts as part of the market is captured inside the firm. Trade of goods and services that occurred in the past between firms now occurs within firms. In principle, intracompany trade affect transacting in a narrow sense as bargaining is no longer necessary, but in a broader perspective transacting within a company can imply transaction tasks as firms have to register, monitor and transport flows of goods and in the end it also depends on whether a company wants to make use of the market mechanism inside the firm or not. Of course, the decision to merge or integrate must be based on the idea that one can save on transaction costs.

The reverse case applies to the phenomenon of outsourcing departments of an organization. The measurement of the transaction sector can in that case in principle be affected because the transactions made within the firm could become visible. The effect should however be limited to jobs or tasks that previously did not exist within the unit. For instance, an advertising department within a firm could be outsourced to become an independent advertising agency. The character of the job or tasks of most employees would not change in the new setting. However, to function properly the add agency needs to employ accountancy services, spend more time selling ideas because the sole client in the previous setting is substituted by many potential clients in the new setting, etc. As far as outsourcing implies *new* tasks for the outsourced department one would expect that outsourcing is an independent source of a growing transaction sector.

These two developments could strongly affect the measurement outcomes. The question is: which methodology gives a more accurate description of transaction activity in a country? Every calculation of the sector distribution – no matter which methodology one uses – would be affected by the firm dynamics, as described above. And the reasons stated above apply equally to our methodology and the one employed by Wallis and North (1986). However, the calculations made by Wallis and North are affected at two levels by outsourcing and integration, whereas in our methodology the measurement results are less affected by such organizational developments.

First, the Wallis and North measurements are affected because industries are first split into transaction and non-transaction categories. If a non-transaction worker (e.g., a secretary) becomes employed in one of the transaction industries her job will suddenly become of a transaction type, even though her work has hardly changed. For instance, outsourcing of an accoun-

tants department of a manufacturing firm has the consequence, first, that the non-transaction industry loses the accountants tied to the outsourcing move and, second, in moving between firms all the non-transaction workers tied to establishing a new accountants firm are subtracted from the non-transactions industry and will become full-fledged transaction workers.

Second, outsourcing and integration could affect outcomes when the reasons for making such choices are influenced by handling the problem of diminishing transaction costs tied to existing principal-agent relationships *within* the firm. Wallis and North register internal firm transaction jobs (like managers, personnel officers and clerks) and one could expect that such firm dynamics affect their measurement results quite heavily (more than two-thirds of employees working in transaction related occupations in Wallis and North are internally focussed). But because the dividing line between transformation and transaction jobs is rather vague we excluded the internal firm transaction jobs from our analysis.

Our aim is to get an accurate insight into the number of people performing transaction tasks; tasks which make *market* exchanges possible. The Wallis and North methodology is in that respect unsuitable for our purposes as it covers up some transformation tasks in transaction industries and because the measurement outcomes are more sensitive to organizational developments such as outsourcing and integration.

### 2.1 *Operationalizing the Transaction Sector*

Our aim is *not* to encompass all the different definitions that exist in the economics literature. We approach the subject of transaction costs somewhat differently. In order to assess the Dutch transaction sector we sum up the number of people performing tasks related to market transactions. We distinguish five 'transaction' tasks that are described below. The details of the various transaction tasks are described in the appendix to this paper. The tasks are:

1. *Pure trade*. This activity concerns buying and selling goods, services, assets and other trade wares that one associates with brokers, merchants and (wholesale) traders. Buying and selling is not restricted to these intermediaries as buyers and sellers are also employed by other firms.

2. *Complementary activities*. Buying and selling is accompanied by such activities as registering trade (warehousing, accounting and storage of goods), inspection of incoming and outgoing goods on quality and quantity, and making sure that payments are made.

3. *Trading ideas and information*. Trade is not only restricted to goods. It also covers the trading of ideas and information and related services. Under this heading one can think of tasks such as legal advice, business

and organization advice, provision of marketing or economic advice, technical advice, and communication in general.

4. *Monitoring.* Trade is generally transacted within the legal bounds of contracts and in order to “grease the wheels of trade” property rights have to be monitored and wherever necessary defended. This task is made concrete by focussing on activities of inspecting (monitoring of regulations and laws), the securing and monitoring of private property and the monitoring and registration of lading or freight papers.

5. *Transport.* One reason for including ‘transport’ in the transaction sector is that there can be no trade of physical goods or services without transport. We note however that transportation costs are different from transaction costs. Transaction costs are analytically analogous to transportation costs as the latter relate to a pair of locations and the former concept to a pair of agents. But in some respects they are quite different as transaction costs do not relate to an individual commodity flow but to pairs of such flows (Niehans (1987)). Each transaction is in fact a quid pro quo. However, we acknowledge the fact that transaction and transport are up to the present day strong complementary tasks (see Casson (1998)). Especially for an open economy with a long history of trading and shipping like the Netherlands, one would expect the transport function to be an important element in sketching a picture of the Dutch transaction sector.

## 2.2 Data

The dataset used in this paper is the Structure of Earnings Survey (SES). The dataset is created by matching three data sources: the Wage and Employment Survey (WES), the Register System of the Social Security Funds (RSS) and the Dutch Labor Force Survey (LFS). The records of the WES and the RSS are matched with the LFS on the variables address, postal code, city, date of birth and gender. Only the records from the RSS that match with the LFS are considered for inclusion in the SES dataset. Some observations of the dataset are imputed by Statistics Netherlands. For more details about the SES dataset we refer to Schulte Nordholt (1998).

As variables, we use the registration number of the firm, the first digit SIC number of the firm, the city where the firm’s head office is situated, and the hourly wage including extra payments for overtime hours. We also use variables on gender and the level of education, based on the highest level of education obtained from the International Standard Classification of Education. As mentioned above, we use the Standard Occupations Classification (SCO) of Statistics Netherlands to find the transaction tasks performed by individuals. Table 1 lists descriptive statistics of the most important variables of the data set.

TABLE 1 – SUMMARY STATISTICS OF THE STRUCTURE OF EARNINGS SURVEY

Variable	Mean
<i>Sex</i>	
Female	0.415
<i>Education levels</i>	
No completed primary education	0.004
Only primary education	0.075
Lower secondary education	0.226
Upper secondary education	0.449
Higher vocational	0.179
College	0.064
Ph.D.	0.008
<i>Education types</i>	
Economics/Business	0.180
Law and public administration	0.022
Social/cultural studies	0.049
Transport	0.017
Other	0.732
<i>Sector of industry</i>	
Agriculture	0.014
Mining	0.002
Manufacturing	0.156
Electricity	0.005
Construction	0.062
Trade	0.158
Hotels and restaurants	0.030
Transportation	0.065
Financial services	0.015
Business services	0.145
Public Administration	0.083
Education	0.073
Health	0.155
Environment	0.036
Number of observations	148,993
<i>Cities (of place of work)</i>	
Amsterdam	0.097
Rotterdam	0.058
The Hague	0.048
Utrecht	0.048
Eindhoven	0.026
Tilburg	0.016
Groningen	0.016
Arnhem	0.014
Nijmegen	0.012



TABLE 1 – CONTINUED

Variable	Mean
<i>Regions (of place of work)</i>	
Groningen	0.025
Friesland	0.028
Drenthe	0.023
Overijssel	0.059
Flevoland	0.008
Gelderland	0.103
Utrecht	0.090
Noord-Holland	0.187
Zuid-Holland	0.257
Zeeland	0.016
Noord-Brabant	0.136
Limburg	0.068
<i>Ethnicity</i>	
Dutch	0.931
Other European (incl. US born citizens)	0.020
Turkish	0.008
Moroccan	0.005
Indonesian	0.009
Surinam	0.015
Other	0.012

### 2.3 Measurement Results

Table 2 summarizes the size and structure of the transaction sector in the Netherlands according to three different measures: persons, hours worked and wages. In particular, we determine the number of individuals performing a particular transaction task and when we add up the individuals who perform at least one of the tasks 1–5 defined above, we obtain the total measure of the transaction sector in the Netherlands as summarized in the final row of Table 2.

We find that the Dutch transaction sector in 1997 constituted approximately 29% of the Dutch labor force (measured in number of persons working) or 28% of the labor force if we weight the number of persons by the number of hours (as laid down in contractual labor agreements). Weighting the total number of ‘traders’ by their annual wages the transaction sector becomes slightly smaller, viz. 26%. The largest sector within the transaction sector is the job category representing ‘pure trade’ activities. The ‘complementary trade’ category and the category involved in transport each are almost half that of the pure trade category and monitoring and trading in ideas and information are by far the smaller categories, although in terms of money value, the ideas traders become more important. The latter fact makes sense as workers who fall in this category are generally highly skilled and invested

TABLE 2 – THE DUTCH TRANSACTION SECTOR, 1997

Definitions of transaction tasks	Employment in persons		Employment in hours worked (incl. overtime)		Value of wages of persons employed	
	×1000	% of total	×1000 hours	% of total	Millions (€)	% of total
1. Pure trade	776	12.8	1,108,747 (11065)	11.4	14,575 (167)	11.5
2. Complementary trade	335	5.5	372,635 (5961)	3.8	3,624 (66)	2.9
3. Ideas and information	177	2.9	286,043 (5160)	3.0	5,660 (113)	4.5
4. Monitoring	126	2.1	209,390 (4583)	2.2	2,846 (64)	2.2
5. Transport	336	5.5	510,617 (7450)	5.3	6,413 (105)	4.8
Total <sup>a</sup>	1,750	28.8	2,682,663	27.6	32,028	25.7

*Source:* Own weighted calculations based on SES, Statistics Netherlands (1997). Monetary values were stated in SES in guilders but for matters of comparison we have recalculated these values in this and subsequent tables into euros (€1 = 2,20371 guilders).

<sup>a</sup>The total does not necessarily equal the total of the subdivisions as people with different tasks may belong to different categories.

heavily in human capital and as a consequence they earn above average wages. In following the definition of transaction costs – the cost of performing the transaction function – the Dutch economy bears the transaction cost of €32 billion, or 10% of GDP.

To offer some comparison with other statistics we also constructed the transaction sector by adding up all the labor resources used in sectors that are focused on making or facilitating transactions. Figure 1 shows the number of people working in six definitions of the transaction sector for the years 1995–2000.

These statistics show that (for the year 1998) 41 % of the workforce is employed in the transaction sector (most widely defined). This percentage amounts to 2.23 million persons. The value added of this sector – defined along the same sector lines as those of Figure 1 – represents approximately 40 % of the gross national income. Hence, using the traditional sector distribution in defining the transaction sector results in a considerable overestimation of the number of workers performing transaction tasks. In addition, we find that the distribution over the five-year period is more or less constant.

### 3 CHARACTERIZING THE TRANSACTION WORKER

As stated in the introduction one of the purposes of the paper is to find the characteristics of a typical transaction worker. We present a reduced form model to answer this question in this section. Let  $y$  be the outcome variable where  $y$  equals one when the individual is working in a job that contains a trade task and zero otherwise. Of course,  $y$  can only take a limited number

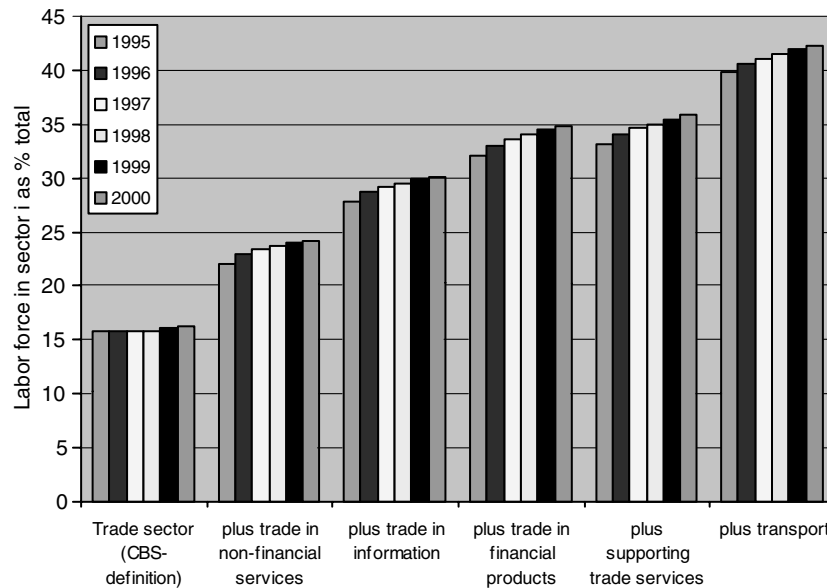


Figure 1 – Cumulative distribution of workforce over various transaction sectors, 1995–2000. The definitions of the various sectors are the following in terms of SBI-codes (see for extensive descriptions: <http://www.cbs.nl/nl/standaarden/classificaties/sbi/index.htm>): (1) trade sector (50100 – 52000); (2) plus trade in non-financial services (45500, 63300, 70201 to 71000, 74500); (3) plus trade in ideas and information (22100, 74100 to 74400); (4) plus trade in financial products (65000–67000, 92710); (5) plus supporting trade services (63100–63200); and (6) transport services (60100–62000).

Source: CBS (various years), national accounts.

of values and hence we model this accordingly. We introduce  $y^*$  as a latent variable and we suppose that  $y^* > 0$  implies that  $y$  equals one, and zero otherwise. In addition, we introduce the vector  $x$  as the set of observed individual characteristics, such as education, age and regional characteristics. We assume the following statistical relationship for  $y^*$  and  $x$

$$y^* = x\beta + u \quad (1)$$

where  $\beta$  is a vector of coefficients and  $u$  is the error term which is assumed to be standard normal. This equation reduces to the classical regression equation when  $y^*$  is observed. Since  $y^*$  is not observed we need to take a different approach. Note that the probability that  $y$  equals 1 is equal to

$$P(y = 1|x) = \Phi(x\beta) \quad (2)$$

where  $\Phi$  is the standard normal distribution. This implies that the probability that an individual performs a task in trading increases with  $x\beta$ . Hence, a

positive parameter value of an element in  $\beta$  results in a positive relationship between this probability and the characteristic that is related to the particular parameter. This reduced form representation of the present limited dependent variable is called the probit model (see Verbeek (2000)).

In addition to the probit estimates of the total trading sector, we also estimate the likelihood that a particular person is performing a *particular* transaction task. Define  $y_i^*$ ;  $i = 1, \dots, 5$  in exactly the same way as  $y_i^*$  was defined above. In that case we estimate the probabilities that a particular trade task is performed.

As stated in the data section, the geographic location of a firm is the city where the head office is situated. For many small firms, this is also the city where the actual production and transaction activities take place. However, this is not always the case for larger firms and it is definitely not the case for public administration. For the latter sector, the geographic location is with a few exceptions The Hague. Although the arbitrary assignment to The Hague affects mainly the dummy variable for The Hague, it also affects all other demographic variables as well as any other variable being correlated with this dummy variable. This is due to the fact that although there is a correlation between the transaction tasks and the dummy variable of The Hague, it is not perfect. This implies that for example the interpretation of the urbanization rate variable becomes difficult. Hence, we decided not to include public administration in the remainder of this particular analysis. This reduces the total number of observations by around 12,000. Apart from the public administration sector, we include all first-digit sectors in our dataset.

The first column of Table 3 summarizes the probit estimates for the probability that an individual performs (at least) one of the transaction activities. The separate probit models for different trade tasks are summarized in the second to the sixth column of Table 3. In discussing the results we point out the most salient results.

### 3.1 Education

With respect to the level of education we find the likelihood to perform one of the transaction tasks to follow an inverted U-shape: compared to those without education the probability of fulfilling a transaction job is at first roughly increasing with education, but after the secondary education level the probability to perform a transaction task is reversed and especially those with higher education are less likely to end up in a transaction job.

With respect to underlying transaction tasks we find that the higher educated are not as averse to transaction jobs as we would have to conclude from the first column. Workers with higher education have a relatively high probability of performing the pure trade task and the task of trading in ideas and

TABLE 3 – PROBIT ESTIMATES OF THE VARIOUS TRANSACTION TASKS

	Total (1)	Pure Trade (2)	Complementary trade (3)	Trade in ideas and information (4)	Monitoring (5)	Transport (6)
Female	0.121 (0.009)	0.296 (0.011)	0.636 (0.014)	-0.043 (0.018)	-0.659 (0.028)	-0.841 (0.018)
<i>Age group (base: 15-24 years)</i>						
25-40 years	-0.196 (0.011)	-0.061 (0.013)	-0.351 (0.016)	0.297 (0.030)	0.091 (0.035)	-0.172 (0.017)
41-55- years	-0.182 (0.012)	-0.052 (0.014)	-0.342 (0.017)	0.399 (0.032)	0.297 (0.035)	-0.268 (0.019)
56 and older	-0.079 (0.022)	-0.018 (0.028)	-0.242 (0.036)	0.450 (0.048)	0.485 (0.050)	-0.233 (0.035)
<i>Education<sup>a</sup> (base: primary education or lower)</i>						
Lower secondary	0.014 (0.015)	0.165 (0.022)	0.092 (0.023)	0.356 (0.072)	0.141 (0.038)	-0.245 (0.020)
Upper secondary	-0.157 (0.015)	0.392 (0.021)	-0.210 (0.023)	0.711 (0.069)	-0.033 (0.038)	-0.714 (0.021)
Higher vocational	-0.346 (0.018)	0.348 (0.025)	-0.593 (0.032)	1.095 (0.070)	-0.780 (0.053)	-1.340 (0.037)
College – university	-0.264 (0.023)	0.214 (0.033)	-0.849 (0.054)	1.385 (0.073)	-1.104 (0.083)	-1.671 (0.076)
Ph.D.	-0.542 (0.062)	-0.171 (0.108)	-0.905 (0.166)	1.181 (0.097)	-1.161 (0.204)	-1.587 (0.221)
<i>Field of education (base: other)</i>						
Economics/Business	0.274 (0.010)	0.253 (0.012)	0.117 (0.017)	0.301 (0.020)	-0.180 (0.034)	-0.028 (0.021)
Law and public admin.	0.820 (0.034)	-0.016 (0.049)	0.565 (0.056)	1.050 (0.039)	0.130 (0.107)	0.349 (0.079)
Social/cultural studies	-0.026 (0.023)	-0.248 (0.033)	-0.102 (0.041)	0.217 (0.032)	0.046 (0.070)	0.193 (0.058)
Transport	0.410 (0.028)	-0.273 (0.043)	-0.018 (0.058)	0.025 (0.036)	-0.119 (0.081)	0.682 (0.031)
<i>Ethnic origin (base: Dutch)</i>						
Other European (incl. US born citizens)	-0.130 (0.028)	-0.138 (0.037)	-0.041 (0.045)	-0.142 (0.060)	0.083 (0.068)	-0.056 (0.050)
Turkish	-0.430 (0.047)	-0.639 (0.082)	-0.164 (0.075)	0.004 (0.112)	-0.356 (0.137)	-0.118 (0.062)
Moroccan	-0.288 (0.062)	-0.528 (0.098)	-0.073 (0.085)	-0.526 (0.256)	0.042 (0.120)	-0.044 (0.078)
Indonesian	-0.243 (0.046)	-0.127 (0.059)	-0.112 (0.076)	-0.040 (0.118)	-0.163 (0.112)	-0.515 (0.110)
Surinam	-0.179 (0.034)	-0.370 (0.051)	0.008 (0.049)	-0.105 (0.074)	0.203 (0.066)	-0.024 (0.055)
Other	-0.164 (0.036)	-0.301 (0.052)	0.045 (0.051)	0.005 (0.074)	-0.032 (0.088)	0.016 (0.057)
<i>Industry (base: agriculture)</i>						
Mining	-0.443 (0.105)	0.172 (0.138)	-	-1.080 (0.194)	-	0.454 (0.154)
Manufacturing	-0.276 (0.022)	0.524 (0.033)	-0.410 (0.036)	-1.043 (0.035)	0.011 (0.083)	0.086 (0.046)

TABLE 3 – CONTINUED

	Total (1)	Pure Trade (2)	Complementary trade (3)	Trade in ideas and information (4)	Monitoring (5)	Transport (6)
Electricity	-0.341 (0.059)	0.057 (0.087)	-0.192 (0.110)	-0.752 (0.087)	0.557 (0.127)	-0.112 (0.131)
Construction	-0.618 (0.026)	0.153 (0.038)	-0.664 (0.053)	-1.346 (0.061)	-0.436 (0.105)	0.002 (0.049)
Trade	0.726 (0.021)	1.445 (0.031)	0.086 (0.032)	-1.279 (0.038)	-0.280 (0.091)	0.518 (0.045)
Hotels and restaurants	0.701 (0.027)	0.509 (0.039)	1.150 (0.036)	-1.473 (0.096)	0.333 (0.099)	0.159 (0.057)
Transportation	0.414 (0.024)	0.382 (0.036)	-0.150 (0.040)	-1.099 (0.044)	0.117 (0.087)	1.372 (0.046)
Financial services	0.082 (0.034)	0.772 (0.043)	-0.105 (0.055)	-0.604 (0.048)	0.069 (0.136)	-0.223 (0.107)
Business services	-0.186 (0.021)	0.233 (0.032)	-0.270 (0.033)	-0.853 (0.031)	0.923 (0.079)	0.371 (0.046)
Education	-0.754 (0.028)	-0.560 (0.046)	-0.534 (0.048)	-1.362 (0.042)	0.984 (0.085)	-0.150 (0.076)
Health	-0.823 (0.024)	-0.501 (0.037)	-0.441 (0.035)	-1.303 (0.038)	0.304 (0.087)	0.029 (0.054)
Environment	0.170 (0.026)	0.530 (0.038)	0.079 (0.040)	-0.693 (0.038)	0.858 (0.085)	0.537 (0.053)
<i>Urbanization rate<sup>b</sup> (base: no urbanization)</i>						
Weak	-0.013 (0.016)	-0.011 (0.020)	0.042 (0.026)	0.017 (0.041)	-0.065 (0.051)	-0.042 (0.024)
Average	0.049 (0.015)	0.045 (0.018)	0.120 (0.024)	0.088 (0.036)	0.168 (0.042)	-0.096 (0.023)
Strong	0.036 (0.015)	0.000 (0.018)	0.162 (0.024)	0.148 (0.034)	0.095 (0.043)	-0.115 (0.023)
Very strong	0.105 (0.021)	0.074 (0.026)	0.185 (0.033)	0.230 (0.045)	0.267 (0.058)	-0.261 (0.036)
<i>Region (base: Utrecht)</i>						
Groningen	-0.049 (0.040)	-0.015 (0.049)	-0.079 (0.067)	-0.148 (0.100)	0.082 (0.114)	0.017 (0.063)
Friesland	-0.027 (0.028)	-0.030 (0.035)	0.035 (0.043)	-0.179 (0.063)	0.172 (0.077)	-0.007 (0.048)
Drenthe	0.077 (0.031)	0.105 (0.037)	0.070 (0.046)	-0.241 (0.077)	0.225 (0.083)	-0.006 (0.053)
Overijssel	-0.076 (0.024)	-0.044 (0.030)	-0.126 (0.038)	-0.169 (0.053)	0.021 (0.072)	0.088 (0.041)
Gelderland	-0.074 (0.047)	0.068 (0.057)	-0.196 (0.080)	-0.303 (0.111)	0.167 (0.125)	0.035 (0.080)
Flevoland	-0.040 (0.023)	-0.033 (0.028)	-0.091 (0.036)	-0.150 (0.050)	0.012 (0.069)	0.108 (0.039)
Noord-Holland	-0.087 (0.023)	-0.021 (0.029)	-0.108 (0.037)	-0.131 (0.048)	0.009 (0.070)	0.029 (0.041)
Zuid-Holland	-0.041 (0.023)	0.012 (0.027)	-0.101 (0.036)	-0.131 (0.047)	-0.073 (0.068)	0.123 (0.038)
Zeeland	-0.119 (0.037)	-0.089 (0.047)	-0.040 (0.056)	-0.290 (0.095)	-0.229 (0.122)	0.046 (0.059)
Noord-Brabant	-0.013 (0.022)	-0.028 (0.027)	-0.030 (0.035)	-0.145 (0.047)	0.017 (0.067)	0.128 (0.038)
Limburg	-0.053 (0.024)	-0.057 (0.030)	-0.029 (0.037)	-0.137 (0.050)	0.139 (0.068)	0.024 (0.041)

TABLE 3 – CONTINUED

	Total	Pure Trade	Complementary trade	Trade in ideas and information	Monitoring	Transport
	(1)	(2)	(3)	(4)	(5)	(6)
<i>Cities</i>						
Amsterdam	0.080 (0.021)	0.001 (0.025)	0.183 (0.032)	-0.013 (0.044)	-0.034 (0.059)	0.010 (0.036)
Rotterdam	-0.096 (0.024)	-0.056 (0.030)	-0.048 (0.038)	-0.085 (0.049)	0.009 (0.063)	-0.059 (0.042)
The Hague	0.020 (0.026)	-0.068 (0.034)	0.038 (0.043)	0.013 (0.051)	0.228 (0.063)	0.186 (0.043)
Utrecht	-0.012 (0.029)	0.020 (0.036)	-0.021 (0.046)	-0.031 (0.055)	-0.127 (0.086)	0.005 (0.054)
Eindhoven	-0.074 (0.015)	-0.077 (0.036)	-0.060 (0.048)	0.009 (0.058)	0.059 (0.081)	-0.078 (0.051)
Tilburg	-0.015 (0.035)	0.077 (0.036)	-0.105 (0.058)	0.117 (0.067)	-0.133 (0.107)	0.038 (0.061)
Groningen	-0.121 (0.052)	-0.091 (0.066)	-0.005 (0.085)	-0.094 (0.118)	-0.166 (0.136)	-0.026 (0.092)
Arnhem	-0.009 (0.038)	0.025 (0.050)	-0.183 (0.070)	0.121 (0.069)	0.173 (0.089)	-0.159 (0.079)
Nijmegen	-0.019 (0.042)	0.026 (0.054)	0.029 (0.065)	-0.044 (0.086)	0.099 (0.106)	-0.097 (0.079)
Constant	-0.388 (0.033)	-2.112 (0.046)	-1.503 (0.050)	-2.180 (0.089)	-2.693 (0.110)	-1.066 (0.058)
Pseudo $R^2$	0.17	0.21	0.21	0.23	0.18	0.27

Note:  $N = 136, 827$  and standard errors are in brackets.

<sup>a</sup>The fields of education categories are in line with the standard education categories (SOI 1998 of Statistics Netherlands): Economics: 60–62 plus 0143,053,0163,0173; Law: 65–66; Social-cultural: 70–71; and Transport: 40–44.

<sup>b</sup>This statistic is based on the number of houses and apartments per square kilometer; no urbanization: below 500, weak urbanization: 500–1000, average urbanization: 1000–1500, strong: 1500–2500, and very strong: 2500 or more.

information. However, the reverse applies for the probability of performing the other transaction tasks.

Besides the formal level of education we also looked at the *type of education* as it would be of some interest to see whether typical ‘transaction’ studies in the educational system lead individuals to follow a career in the transaction sector. The first column of Table 3 confirms this hunch as those who are educated in economics, law and transportation have a higher probability to perform one of the transaction tasks. Interestingly, we find this probability to be higher for law and transportation than for economics. This is not that surprising when we take into account that many of our transaction tasks are not captured in the discipline of economics as it is being taught in the Netherlands. We can also deduce this from columns 2 to 6 of Table 3 when we look at the more detailed categorization of the transaction tasks. We find that those who hold a major in economics have a higher probability to perform tasks in pure trading, while those who studied law have a very high probability to perform a task in trade in ideas and information. Not surprisingly, individuals with a formal education in transportation have a high probability to perform a task in that field.

### 3.2 *Ethnicity*

Looking at the ethnic origin of individuals, we find that Dutch individuals have the highest likelihood to be transaction workers, while those workers who are from an Islamic origin have the lowest likelihood. Migrants are less likely to participate in any of the different transaction activities. However, there is one exception, which is Surinam workers are more likely to participate in monitoring. The fact that immigrants do not end up in transaction jobs as much as the Dutch natives is quite remarkable since it is in contrast with the history of Dutch immigration of a distant past.<sup>3</sup> The history of the Netherlands is littered with examples of how foreign entrepreneurs have enriched the business networks of cities like Amsterdam, Leiden and Dordrecht (cf. Lesger and Noordegraaf (1995)). Van Eijl and Lucassen (2001, p. 171) show that up and till the census of 1909, immigrants (especially Germans) had a job or a business in the trade sector. Furthermore, their position in the hierarchy of firms, compared to native Dutch men, was high: the

<sup>3</sup> One may argue that this is not the complete picture since it does not include the self-employed, who are likely to perform transaction tasks as well. Looking at the Dutch Labor Force Survey of 1999, we find that 11.8% of the Dutch population were self-employed. This number was only 8.5 among the Turkish population in Holland and as low as 3.5 and 4.1 among the Moroccan population and Surinam population in Holland. Hence, we can argue that even if we would include self-employment into the analysis this conclusion would not change.



percentage of owners, directors and managers that were present at that time inside Dutch organizations was relatively high. However, from the 1920 census onwards their position is hardly different from Dutch men and women and our estimates show that this picture has hardly changed.

One of the reasons why ethnicity does not play a role in today's likelihood to perform a trade task could be that the present migrants differ in characteristics from those in the more distant past. In particular, it is well known that the migrants in the past centuries hardly differed in education level from the Dutch residents. This is not the case anymore since many of the migrants since World War II have relatively low education levels. We find that there is especially a strong negative correlation between the education level and migrants from Turkey, Morocco and Surinam.

### 3.3 *Sector Distribution*

The main point of our calculations on the basis of occupational data is to show that most firms and sectors are a mixture of transaction and transformation tasks. Still one would expect the sector distribution to matter as, e.g., wholesale trading firms are inclined to employ far more transaction workers than a school or hospital. The estimates in Table 3 make this particularly clear: the sector of industry clearly matters. Transaction tasks are heavily concentrated in the trade sector, hotel and restaurants and transportation sector. By looking at the underlying transaction tasks one can see that the essential task of trading (pure trade) is heavily concentrated in the trade sector and financial services, complementary trade is heavily concentrated in hotels and restaurants and transport in the transport sector. The tasks described in columns (4) and (5) deserve some special attention as the coefficients are not entirely intuitive. The sectors with relatively many idea traders are agriculture and financial, environmental and business services. Pinpointing agriculture as a sector that stands out in trading ideas seems somewhat odd and is most likely due to the correlation of agriculture with other variables such as education and the geographical variables. Because these variables tend to decrease the probability that a typical agricultural worker performs a task in trading ideas, the large difference with the other sectors needs to be interpreted as a correction term. The appearance of environmental services in this category is not as strange as it may appear at first sight as relatively many (highly educated) advisors are involved in the provision of environmental and technical advice.

The picture is a more plausible one for the monitoring worker, but again it should be pointed out that this is a small group where 'outliers' can easily affect the coefficients. Still the fact that monitoring appears to be heavily concentrated in education, environmental and business services can be explained

to some extent by looking at the professions performed in these sectors. The profession of 'education inspector' is a well-known example of a job that monitors the regulations and laws. In that respect one can also understand why environmental services employ so many 'monitors' as there are numerous environmental regulations that need to be monitored. The business services sector offers some specialized professions (accountants, insurance damage assessors and numerous types of inspectors to check construction or production activities) that often entail higher education.

### 3.4 *Place of Trade*

Does the place of trade still matter? To answer this question in some detail we use three regional dimensions of the place of work: (1) the level of urbanization, (2) the province, and (3) whether or not transaction work was carried out inside the agglomeration of one of the nine largest cities of the Netherlands. The reason for making this distinction is that the level of urbanization gives an indication of economies of scale or scope in performing transactions and the province and the various cities give an indication of how specific characteristics (e.g., location, history, endowments) of a region or city impinge on the choice of a transaction job.

If we take a look at the first column we must conclude that transaction jobs are not heavily concentrated along geographical dimensions, with the exception of the agglomeration of Amsterdam. The picture changes distinctively if we focus on the underlying transaction tasks. The pure trading task (column 2) seems to be evenly distributed across the Netherlands. The other transaction tasks show, however, marked concentrations where the complementary trade, trade in ideas and monitoring activities are positively associated with the level of urbanization. The association between the task of monitoring of regulation and laws and the level of urbanization is especially strong and positive. The transport function is, however, negatively associated with the level of urbanization, which makes sense as the Netherlands is a densely populated country. Situating a transport business inside an agglomeration would therefore not be a very wise choice as real estate prices are high inside cities and traffic in and out of cities is often congested.

Overall, the *absence* of a clear geographical pattern of transaction activities is perhaps the most noteworthy observation to be made. It is perhaps a clear sign of how the character of shipping and transportation in the cities of Rotterdam and Amsterdam has changed radically over time. Rotterdam is still one of the dominant ports in the world, but shipping and transportation in general (e.g., container terminals) have become highly capital intensive. The absence of a clear concentration of employment of workers performing trans-

port tasks is in that respect not surprising (see Table 3, cities' dummies). It becomes a different matter when one takes a look at the other transaction tasks. Major ports were in the past also major trading cities and this does not seem to apply any longer to the Rotterdam case. The case of the city of Amsterdam tells quite a different story. It is situated near a major airport (Schiphol) and it seems to be making the transition to becoming a trading, c.q. transaction city. For instance, 17% of the Amsterdam employment (not shown in Table 3) concerns jobs in trading in ideas and information, compared to 5% for the same job category in Rotterdam.

#### 4 DID THE TRANSACTION SECTOR GROW OVER TIME?

In gaining the status of a trading nation the Dutch had to invest in long distance trading relationships, in transport and logistics technology, in banking and insurance and in accompanying institutions like laws, courts and social norms. Although the knowledge and infrastructure that supports trading in goods and services may be of a softer kind than necessary to maintain a foothold in manufacturing, it can perhaps make specialized trade, investments and production irreversible. If so, we would expect the Netherlands of, say, the early twentieth century or even the early nineteenth century to be quite similar in structure to the modern-day Dutch economy. At first sight this seems to be the case, as the value added generated in the trade sector has always been high. Even at the start of the twentieth century when the Netherlands apparently had lost most of the glory of its Golden Age image, the value added per worker in the Dutch trade sector was still 20% higher than that of the British trade sector, which was at that time one of the world leaders (Burger and Smits (1996)). And inspecting this remarkable comparative productivity statistic somewhat closer, it does not appear to be the result of high trade margins. On the contrary, Dutch trade margins were rather low compared to the UK and the turnover per worker was substantially higher in the Netherlands than in other countries. Burger and Smits (1996, p. 149) point out that the strong development of the volume of foreign trade is the prime candidate for explaining this Dutch characteristic. However, dominance of international trade is not a specific Dutch characteristic as most small open economies in Europe have a high net export performance. But what makes the Netherlands such a remarkable case is that it has such a long track record in international trade and the puzzle is, of course, what lies behind this apparent tradition in trading.

There are a number of population censuses carried out at regular intervals that can be used to obtain an impression of the size of the transaction sector in the past. In Table 4, we present figures on employment in trade related sectors of the Dutch economy and of employment in transport over the past two centuries. What is immediately clear is that this primitively assembled

TABLE 4 – STRUCTURE OF TRANSACTION RELATED EMPLOYMENT IN THE NETHERLANDS, 1807–1998 (% OF WORKING POPULATION)

Year	Trade related sectors <sup>a</sup>			Transport, storage and communication sectors		
	Male	Female	Total	Male	Female	Total
1807	–	–	9	–	–	4
1849	9	7	9	8	0	6
1859	9	6	9	8	0	6
1889	10	8	10	8	1	6
1899	12	9	11	8	0	6
1909	13	10	12	9	1	7
1920	14	20	16	10	2	8
1930	16	24	18	10	1	8
1960	18	34	21	8	2	7
1983	24	36	28	8	4	7
1990	25	35	29	8	4	7
1998	32	34	33	8	4	6

*Source:* Statistics Netherlands (2001b).

<sup>a</sup>Trade related sectors are retail and wholesale trade, restaurants, banking, insurance and business services.

‘transaction sector’ made up 13% of the working population in 1807. And because of the continuous shift in economic activity, the transaction sector has in 1998 reached the volume of 39% of the working population. The latest figure accords well with the numbers we presented in Figure 1 (section 2). In other words, over almost two centuries the percentage of people involved in bringing about trade tripled.

It is tempting to embrace such a spectacular rise in trading activity. This conclusion also seems to be in accordance with the Wallis and North (1986) calculations. They put considerable effort in measuring the US transaction sector for the period 1870–1970. According to their measurements (and definitions) the number of people involved raised from roughly 10% in 1870 to 38% in 1970 and in terms of the aggregate amount of resources employed, they estimate that the transaction sector increased from roughly one quarter of GDP in 1870 to over one half of GDP in 1970. In our view these calculations could well overestimate the spectacular rise of the transaction sector because no account is taken of the transformation *and* transaction activities that are carried out by firms in different sectors of the economy. To rephrase this, the tacit assumption concerning employment figures is generally that those employees working in manufacturing are factory workers and those working in trade sectors, like the retail and wholesale trade, are retailers or wholesalers, and so on. This kind of circularity does not help us much

TABLE 5 – COUNTERFACTUAL STRUCTURE OF TRANSACTION SECTOR IN THE NETHERLANDS, 1807–1998

Year	Percentage involved in trade activities					
	Pure trade (1)	Complementary trade (2)	Trade in ideas and information (3)	Monitoring (4)	Transport (5)	Total trade (1)–(5)
1807	8.4	3.0	1.0	0.9	5.4	18.7
1849	8.6	2.9	1.0	0.9	5.9	19.2
1859	8.5	2.9	1.0	0.9	5.9	19.1
1889	8.8	3.1	1.1	1.0	5.7	19.6
1899	9.3	3.2	1.1	1.0	5.7	20.4
1909	9.7	3.4	1.2	1.0	6.0	21.2
1920	10.2	3.6	1.4	1.0	6.3	22.4
1930	11.1	3.9	1.4	1.0	6.2	23.7
1960	11.7	4.1	1.6	1.2	6.0	24.6
1983	11.8	4.7	2.0	1.8	5.7	26.0
1990	12.0	4.9	2.0	1.9	5.5	26.3
1998	11.9	5.0	2.2	2.1	5.4	26.6

*Source:* Statistics Netherlands (2001b) and our calculations based on weights derived from the SES (1997).

The total transaction input weights per sector are for: agriculture and fisheries: 0.104; manufacturing: 0.189; energy and water: 0.124; building: 0.107; trade sector: 0.597; restaurants/hotels/cafes: 0.575; transport sector: 0.458; finance: 0.354; business services: 0.248; public management: 0.254; education: 0.052; health and welfare: 0.077; environmental services: 0.351. More detailed transaction task weights are not listed here for matters of brevity but these can be received upon request.

in sketching a picture of the present state of transaction work and its evolution. In order to see how things *could have evolved* if the ‘transaction technology’ of 1997 would have been constant, we constructed Table 5. We calculated the fraction of trade employment in every sector of the economy and applied these weights to each and every sector from 1807 to 1998. The end result of this exercise is Table 5, where all the different transaction task categories of Table 2 are calculated. The main conclusion from this table is that apparently the “propensity in human nature” to truck and barter of the Dutch working population has changed over almost two centuries far slower when one takes account of the transaction employment shares of the traditional sector definitions. The total transaction sector covered in 1807 19% of the workforce and in 1998 it covered 27%. Elements of transaction that show big changes are the trade in ideas and the monitoring task. The share of people who tend to the task of transport hardly changed.

Of course, the constancy of transaction technology is a heroic assumption and our calculation serves the role of a bold and thought-provoking counterfactual in the absence of real data from the distant past. However, there are sound reasons why this picture may be more reliable than one might think at first glance as processes of vertical integration or outsourcing, that frequently occurred in many businesses, need not distort our estimates of the transaction sector heavily. E.g, when a firm vertically integrates with an intermediary it internalizes the economies of scope or scale within the firm, and as long as the same tasks are performed (but this time inside the walls of the firm) our macroeconomic estimate of the transaction sector would not register this change of organization. In that respect this macroeconomic accounting exercise makes it all the more suitable for historical comparisons as it captures the true content of work – the mix of transaction and transformation jobs – which a traditional sector approach cannot. Of course, the approach employed in this paper misses out on the details of market and governance structures that lie behind the use of transaction jobs. More integrated governance modes in business and government are associated with a higher degree of asset specificity,<sup>4</sup> greater uncertainty, more complex transactions or more frequent exchange. The assumption that the governance structure in two centuries time did not change seems not realistic, even though these elements of transaction costs could just as well cancel out at the macroeconomic level. One can make a persuasive case that transacting was far more difficult in the nineteenth century as the system of rule-based governance was not as widely developed as it is today. Gathering information was probably more time intensive and the absence of well-defined standards in the quality of goods and contracting made trading an element of business that made middlemen a profitable profession. Hence, the growth of the transaction sector remains a remarkable long-run shift in labor tasks, even though it does not by far approach the growth rate calculated by Wallis and North.

## 5 CONCLUSIONS AND DISCUSSION

The Netherlands are widely recognized as a nation of traders, or to rephrase this in the words of Adam Smith, “a certain propensity in human nature” of the Dutch seems to be especially well adapted “to truck, barter and exchange one thing for another” (Smith (1976), volume 1, chapter II). Despite the widespread agreement the research on the costs of making transactions is scant. In this paper, we offer a first attempt for the Netherlands in assessing the size and structure of the transactions sector. According to our definition of transaction workers 25% of the Dutch labor force is involved in the “propensity to

4 Asset specificity is perhaps the most important element in transactions as it can give rise to a holdup situation. It is a very broad concept as it can cover a variety of assets in practice (Williamson (1996)).

truck and barter” and if one includes the transport tasks as part of the transaction sector one even ends up with 29% of the labor force. The Dutch transaction sector is therefore a sizeable one, certainly if one takes into account that we restricted our attention to transactions that are carried out *outside* the walls of the firm, whereas a considerable amount of transacting goes on inside the firm. However, at this point one should be careful in drawing conclusions on the efficiency of transactions as measured by size of a transactions sector.

With respect to the characteristics of the typical transaction worker one has to arrive at the conclusion that transacting does not require high levels of education. The only exception to this rule is the task of trading in ideas and information: the average transaction worker in this ‘sector’ is far higher educated than the average Dutch worker. Furthermore, there seems to be a split in the sex composition of transaction workers: women are on average more likely to be found in pure transaction jobs, and jobs that cover complementary trade and trade in ideas, whereas men are more likely to be found in monitoring and transport jobs. Immigrants apparently play no role of significance in performing one of the transaction tasks, an observation that is in line with the post-World War II trend of immigrant workers moving away from jobs in trade related sectors. The ethnic groups that we studied are generally employed in low-skilled manufacturing jobs.

Much of our macroeconomic estimates are unfortunately not comparable to other empirical work as most contemporaneous stories of trade do not take transaction costs into account or focus on transaction tasks. The empirical research in the domain of transaction cost economics seems to concentrate more on the microeconomic side of exchanging property rights and organizing governance structures that minimize transaction costs (Boerner and Macher (2002)). The only exception to this rule is a paper by Wallis and North (1986) that suggests that over the period 1870–1970 the transaction sector almost quadrupled. Their calculations could well overestimate the spectacular rise of the transaction sector. A similar exercise based on historical labor force data for the Netherlands arranged in this paper suggests that over the last two centuries the transaction sector tripled. However, our conjecture is that the transaction sector has always been sizeable and that the standard sector classifications hide the transaction tasks and jobs that are carried out within each and every industry, just like transformation tasks are carried out inside traditional trade sectors. If one corrects for the structure of transaction jobs in each and every industry the growth of the transaction sector share in employment over almost two centuries was not 200% but 42%. In the absence of real comparable research, it is rather difficult to assess the plausibility of our results and only future research in an international perspective can shed some light on whether or not the Dutch case, as we have described it, is an extraordinary one.

## APPENDIX

## DEFINITIONS OF TRANSACTION TASKS/JOBS

In the statistics of most statistical agencies it is difficult to get a grip on the nature of trade and trading activities because the traditional sector classification dominates national accounting. To obtain a better insight into the nature of trade we have tried to distill trading activities by looking at the labor force survey of the CBS and use the Standard Classification of Occupations (see CBS (2001a)). The CBS classifies 128 different job tasks and the tasks which come closest to pure trade are defined by us as all persons who are involved in one of the tasks in their day-to-day activities. The following five definitions have been used throughout this exercise. The SCO distinguishes not only predefined occupations, it also distinguishes between job tasks, which is essentially the smallest measurement unit at which one can focus. A task is the set of activities that an individual performs or is supposed to perform with concern to his or her job. In order to go beyond predefined jobs we can distill the elements of trading and entrepreneurship which is part and parcel of every firm, but which differs from one sector of the economy to the other. An entrepreneur is a general category as this person not only coordinates the internal organization of a firm and organizes the financial means to cover investments, he or she also has to develop the external organization of the firm's product or service. In other words, this particular task covers the buying and selling or marketing of the product. The latter task can be well defined as a trading or transaction task and the trader is therefore a subset or specialization of the entrepreneur as he or she specializes with respect to bringing about trade.

*Definition 1: Pure trade.* Job task number 033: *wholesale trading*. This activity covers the buying and selling in bulk of goods, assets, services and other trade wares or providing of brokerage services which supports the aforementioned transactions. Acquisition of assignments or making of value assessments based on experience with prices in a particular business sector.

Job task number 034: *buying*. Buying, renting or leasing of raw materials, products or services, of which price, quality and delivery conditions fit the production and sales policy of an organization. To carry out market research and deal with offers, quotations.

Job task number 035: *selling: commission based representation*. Selling, renting or leasing of goods or services. In order to sell one has to visit customers in their house or firm. Informing and giving of advice concerning the possibilities of mixtures, the use and applications of goods and services.

Job task number 036 *selling (excluding representation)* Selling, renting or leasing of goods and services, by telephone or in face-to-face communication. Informing and giving of advice concerning the possibilities of mixtures, the



use and applications of goods and services. Also the acquisition, the making of official offers en the sales of advertisements belong to this task.

No trade is of course complete without with accounting and warehousing of goods so we have defined these complementary activities as:

*Definition 2: Complementary trade.* This task covers all those activities that have to do with the reception of customers or clients by means of standard procedures (job task number 032); the settlement of accounts at a cash register or providing of tickets or receipts (job task number 037); and the warehousing, accounting and storage of goods and to inspect incoming and outgoing goods on quality and quantity (job task number 038).

*Definition 3: Trade in ideas and information.* An additional classification can be defined by taking a look at the trade in ideas and information. This covers the activities which apply to the giving of legal advice concerning business and family affairs (job task number 009); giving of business or organization advice (job task number 010); the provision of marketing or economic advice (job task number 011); the provision of technical advice, concerning raw material use, production techniques or environmental affairs (job task number 012); the provision of social, psychological or pedagogical advice (job task number 013); and communication, the task of informing people, orally, by means of lectures or talking to the press, or in writing, by means of press releases, brochures or articles (job task number 014).

*Definition 4: Monitoring.* This category covers the activities of inspecting, which boils down to monitoring of regulations and laws (job task number 008); the securing and monitoring of private property (goods, buildings, land), the monitoring and registration of lading or freight papers (job task number 049).

*Definition 5: Transport.* Finally, we have to define the task concerning transport. These activities are the loading and unloading of goods in trains, airplanes, ships, lorries. During the loading the quantity of goods is checked (job task number 039); physically delivering of goods or materials (job task number 040), the transporting of goods or materials, manually (job task number 041); to steer or navigate an (freight) airplane (job task number 043); to navigate a ship (job task number 044); to steer a train (job task number 045); to steer a lorry (job task number 046); to steer a van or car (job task number 048) in order to transport goods and/or persons.

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