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Time requirements for administrative activities
An investigation into firm size effects

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Summary

EIM has developed the MISTRAL approach as a means to systematically study the administrative burden. The MISTRAL approach is based on an analysis of all individual administrative activities that are required for the compulsory transport of information by businesses to government. For each activity, frequency, tariff and time requirement are established during an intensive multi-stage process. Both frequency and tariff can vary with size class, but activity time (the time requirement for individual activities) is assumed to be independent of firm size. This is due to the disaggregated level at which activities are defined, in combination with the MISTRAL approach in which ex ante expected size-class effects for a certain activity may be removed by splitting that activity into separate activities for each size class.

This SCALES paper examines the assumption that activity time is independent of firm size (measured by the number of employees). Existing theories on (dis)economies of scale and scope and wage differentials are unclear on what to expect. For relatively complex activities such as becoming familiar with information obligations or checking agreements and declarations, the activity time might be related to the number of employees. For activities such as receiving, copying and sending information and documents, no theoretical arguments have been identified that suggest a firm-size effect.

For the empirical examination of the existence of a relationship between firm size and activity time, data is used that has been gathered from two projects applying the MISTRAL approach. This results in a dataset with information on many different activities, with only a few observations for each activity. By using a relative measure for activity time, observations for different activities can be combined in the analysis. To this end, relative activity time is defined as the ratio between the measured activity time and the standardized activity time for a certain activity.

The empirical results suggest that, within the examined policy areas, firm size has no noticeable relationship with activity times. First of all, there exists no significant difference in average relative activity time between firms of different size classes. There are also no significant correlations between these variables. Next, these results are confirmed by regression analysis, where relative activity time is estimated as a function of firm size and other variables that might be of influence on activity time (such as experience of employees, the presence of a specific department for administrative activities, and whether additional adaptations and/or computations are required for a specific activity). Relative activity time tends to be higher for activities that require additional adaptations, but is independent of the size of the firm.

Despite the limitations of the dataset used in the current study, we may conclude that this study provides no indication of a relationship between firm size and time requirements for activities defined by the MISTRAL approach. Apparently, the MISTRAL approach succeeds in its objective of defining activities at such a desaggregated level that time requirements are generally independent of size class.

1 Introduction

Governments impose obligations on businesses, to regulate their behaviour and to acquire information about their activities for control purposes. The first type of obligations relates to the 'content' of these activities and endeavours to achieve compliance of businesses with the stipulated norms by society. The second type relates to the compulsory transport of information by businesses (Nijsen, 2000). The cost of businesses for the compulsory transport of information is called administrative burden.

In 2001, the administrative burden for all Dutch firms added up to more than 9 billion euro on a yearly base (Boog *et al*., 2002). To an increasing extent, it is becoming recognised that unnecessarily high administrative burden may have adverse effects on economic growth and employment. Information obligations place a relatively heavy administrative burden on medium-sized and small businesses (De Wit and Nijsen, 2002). For this reason, a policy is being developed, both nationally and internationally, to aim at eliminating or preventing unnecessary compliance costs – in particular for small and medium-sized businesses (EIM,1995; OECD,1997).

To allow for a systematic study into this administrative burden, EIM has developed the MISTRAL approach. MISTRAL, the Dutch acronym for ***M***eet***I***n***str***ument ***A***dministratieve ***L***asten (Measuring Instrument Administrative Burden), represents a specific approach to calculate administrative burden for businesses in an adequate and efficient way. This approach breaks the administrative burden down into its smallest constituent parts: administrative activities, such as gathering information, making calculations, and filing results.

MISTRAL allows for the possibility that the administrative burden differs between sectors and size classes. The total administrative burden depends upon the time, tariff and frequency of the individual administrative activities, and both tariff and frequency can vary with sector and size class (Nijsen and Vellinga, 2002). However, within the MISTRAL approach, the required time to carry out specific activities (the activity time) is assumed to be independent of firm size. The argument underlying this assumption is that activities are defined at such a disaggregate level that the required activity time depends only on the characteristics of the activity. This assumption has, however, not been tested empirically.

Although the impact of firm size on activity time has not been examined before, there is an abundance of literature that indicates that, at a more general level, small and large firms differ from each other in many aspects of their internal organization (Bernardt and Muller, 2000; Meijaard *et al*., 2002; Thurik, 1999). The goal of this study is, therefore, to examine empirically whether the required time per activity is related to the number of employees.

The next chapter briefly discusses the framework of the MISTRAL approach. Next we present theoretical arguments why the required time per activity may be related to the number of employees, despite the MISTRAL methodology. The methodological approach of this study is discussed in chapter four, after which the results of the analysis are presented in chapter five. We end with the main conclusions.

2 The MISTRAL approach

2.1 Introduction

This chapter presents a brief overview of the MISTRAL approach[1]. We provide a definition of administrative burden and present the main elements in the MISTRAL approach to determine this burden. Finally, the measurement of time requirements of individual activities is discussed.

2.2 A definition of administrative burden

Dutch legislation comprises various policy areas. Within each policy area, obligations exist that require organizations to transfer specific information to the government. This information is primarily used to monitor and enforce compliance with existing legislation. The cost of providing this information to the government is known as administrative burden. Specifically, administrative burden is defined[2] as the total cost (at a national level) of legally obliged information transfers from business to government or to enforcing institutes.

2.3 Obligations, messages and activities

The administrative burden for a policy area is the cost of all the obligations set forth in that particular policy area. Each obligation requires specific information transfers. Within the MISTRAL approach, these information transfers are called messages. The cost of each obligation is the sum of the costs of all messages associated with this obligation.

Each message, in turn, requires that a certain number of activities are carried out. Examples of such activities include getting acquainted with the information government needs, gathering this information, asking for advice, making calculations and checking them, filling in documents, sending them to government or enforcing institutes, filing documents, etc.

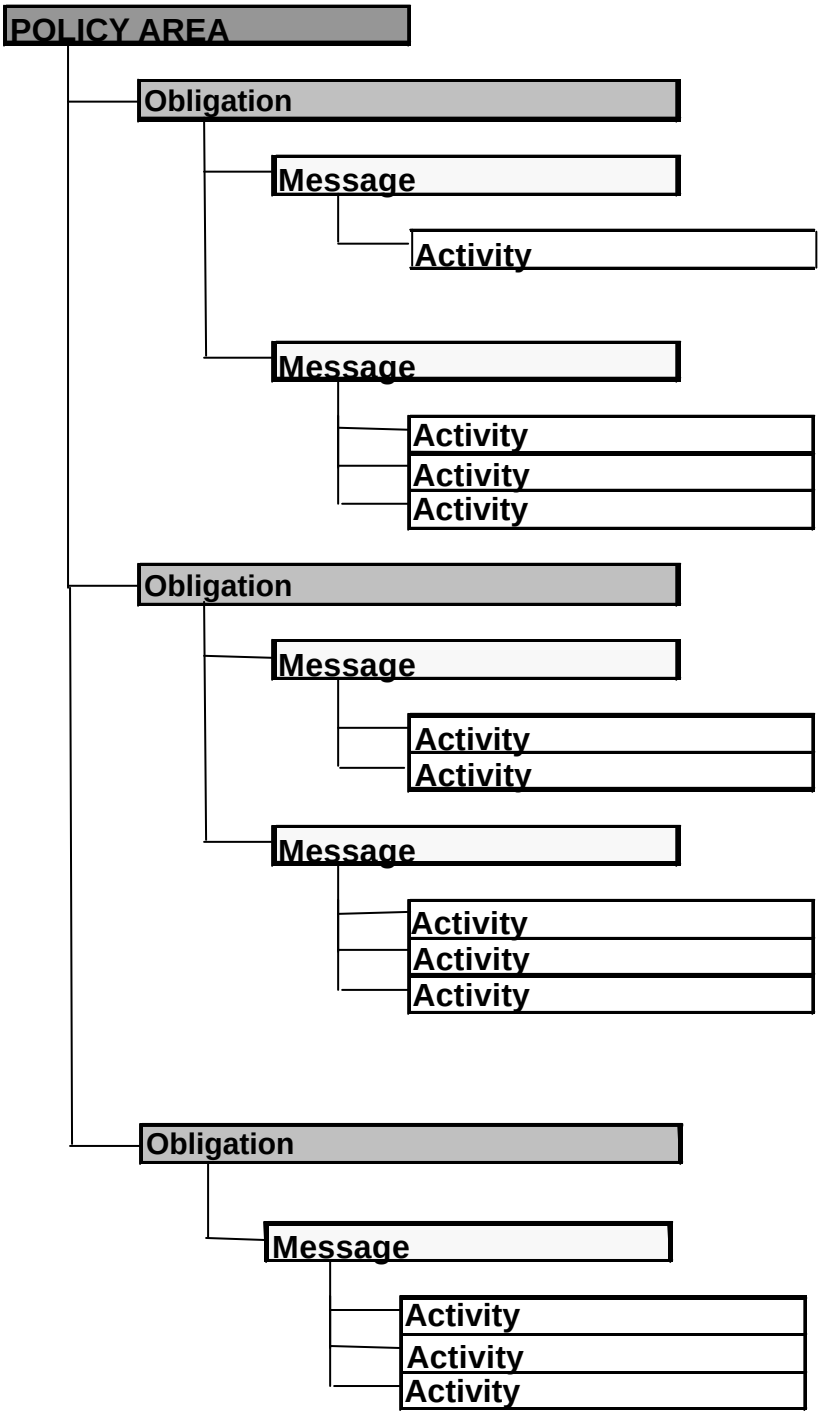
Thus, within each policy area, the MISTRAL approach distinguishes three conceptually different levels at which the information requirements can be examined: obligations, messages and activities (figure 1). The specific number of obligations, messages and activities within a policy area depends upon the structure and content of the relevant legal articles. For example, obligations may call for several information transfers, but there are a number of policy areas for which the obligations only require a single message to be sent[3]. Likewise, it is possible that a message requires only one activity to be performed (figure 1).

[1] This chapter is based on an elaborate discussion of the MISTRAL approach in Nijsen and Vellinga (2002). A full account of the development of the MISTRAL approach is provided by Nijsen (2003).

[2] This definition is a.o. applied by the Dutch legislator.

[3] This holds for all policy areas that are included in the empirical part of this paper. An overview of all policy areas, obligations, messages and activites included in this paper is presented in annex I.

figure 1 Structure of the Mistral approach



Source: Nijsen and Vellinga, 2002.

2.4 Activities and time requirements

To determine the administrative burden of a specific law or regulation, this law or regulation is subjected to a detailed examination during which all information transfers and the accompanying administrative activities are unravelled. For each separate information obligation, a blueprint is being made of how to deal with the administrative requirements of this obligation. This blueprint is made up during an intensive multi-stage process of consultations and discussions – both individual and in groups – with experts from firms, accountants and also employers' and enforcing organisations.

The administrative burden associated with each obligation is calculated as the total cost of all activities that are involved. For each activity, the cost depends on its frequency, tariff and time. The frequency is the product of the number of times (per year) that an activity has to be performed and the number of organisations that has to perform this activity. The frequency can vary between sectors and size classes, to reflect the fact that not all organisations have to perform all activities. For example, the Law on Annual Accounts imposes different obligations, messages and activities on small and large firms.

The tariff represents the relevant hourly wage, including a percentage for overhead cost. The tariff varies between sectors and size classes, to represent the variation in wages. In addition, a distinction is made between internal and external tariffs. Some businesses prefer to outsource part or all of their administrative activities. For example, small businesses often outsource certain activities because they lack the qualified personnel to perform these activities (efficiently) themselves. The relative importance of internal and external tariffs is determined by the proportion of outsourcing, which can differ between size classes (Nijsen and Vellinga, 2002).

The third determinant of the cost of individual activities is the time that it takes to perform those activities. During the consultations with the involved experts, the time necessary to carry out every separate administrative activity is being standardised according to 'average efficient practice'. Standardization ensures that inefficient behaviour of individual firms is not included in the administrative burden[1]. Contrary to frequency and tariff, time requirements of MISTRAL activities are assumed to be independent of size and sector. One of the basic ideas of the MISTRAL approach is that administrative activities are defined at such a disaggregated level that the standardized time to fulfil each activity is independent of the number of employees. If experts identify exogenous factors that may cause time requirements for specific activities to differ substantially between firms, they may decide to split that activity into different activities. Which of these activities is relevant for an individual firm depends upon those exogenous factors. These may include firm size, but may also refer to sectoral differences or the presence of specific administrative software. In this paper we examine to which end this procedure has met its goal, i.e. that measured time requirements are independent of the number of employees.

CASH: of limited use only

Data resulting from the steps described above (standardising activities and time necessary per activity) can be registered in a classification system of administrative activities, named CASH (the Dutch acronym for Classification system of AdminiStrative Activities – activities are 'Handelingen' in Dutch). This has been done for several policy areas within

[1] The issue of standardization is further discussed in section 4.2.2 in Nijsen and Vellinga (2002).

the fiscal domain of taxation of income and earnings. The basic idea of CASH is that administrative activities within the fiscal domain are of a rather generic nature. They are not very specific for policy areas, information obligations, and messages, nor for different industries or different size classes. Today, this database contains thousands of different administrative activities, all of which have been clustered into fourteen basic administrative activities.

For the policy areas included in the empirical part of this paper, the usage of CASH is rather limited. This is due to the fact that the majority of activities outside the fiscal domain cannot be classified into one of the fourteen basic administrative activities in CASH. Consequently, CASH is used only to determine the time requirements for a limited number of activities, such as receiving, printing, filing and sending information.

3 Time requirements and firm size

3.1 Introduction

The goal of this study is to examine empirically whether the required time per activity is related to the number of employees. To our knowledge, the relationship between firm size and average efficient time of performing basic administrative activities has not been examined before, neither empirically nor theoretically. At a more general level, however, ample research has been done on determinants of average (production) costs and on firm-size differences in the internal organization of production processes (Bernardt and Muller, 2000; Meijaard *et al.*, 2002; Thurik, 1999). Especially the existence of (dis)economies of scale and scope is often used to explain why and how average production costs may depend on production volume, and hence on firm size (Bernardt and Muller, 2000).

In this chapter, we shall briefly discuss (dis)economies of scale and scope, and to which extent activity times may be subject to these (dis)economies. In addition, we discuss why activity times may also depend upon wage differentials between small and large firms[1]. Examples of specific activities that are included in this chapter are taken from the policy areas included in the empirical part of this paper.

3.2 Firm size and production costs

3.2.1 *Economies of scale*

Economies of scale occur when an increase in production volume causes decreasing average costs of production. Economies of scale can be internal and external, depending on whether they are created within the firm of by co-operation with other firms. Regarding (internal) time requirements for administrative activities, only internal economies of scale are relevant.

Bernardt and Muller (2000) identify several factors that may cause economies of scale. Three of these factors may also be relevant for the 'production' of administrative activities: indivisibilities, economies of specialisation and organisation, and learning or experience effects[2].

Indivisibility

Indivisibilities are fixed costs that do not vary with the level of production, so that average total costs are higher with low production volumes. In the short run, there may be many indivisibilities, such as machines, buildings, costs of information gathering etc. In the long run, indivisibilities become less important.

[1] This chapter is mainly based on Bernardt and Muller (2000). In addition, it includes specific elements from Meijaard *et al.* (2002) and Thurik (1999).

[2] The other factors that are discussed by Bernardt and Muller (2000) are economies due to risk spreading, economies of massed resources, and economies of vertical integration.

An example of an indivisibility is the cost of specific administrative software that may be used to produce the requested administrative activities. Depending on the number of activities for which the specific (software) investment may be used[1], the cost of specific software may result in a serious threshold. Since smaller firms have on average less financial resources than larger firms have, and often have more difficulties in obtaining external financial resources (Fu *et al.*, 2002), this threshold may be more difficult to overcome for smaller firms than for larger firms.

The cost of both ICT hardware and software has, however, exhibited a continuous decline over the past decades. Computer hardware and software are available for most firms, allowing them to store and retrieve a large part of the required information for administrative activities. Some authors even hold these developments to be a major explanation for the transition of modern industrialised countries from managed economies (based on large enterprises) to entrepreneurial economies (with a pivotal role for small and medium-sized enterprises) (Audretsch and Thurik, 2000; Thurik, 1999).

In addition, not all activities benefit from ICT investments. Especially activities such as receiving, copying and sending information and documents are not likely to benefit from ICT investments.

It is therefore uncertain to which extent indivisibilities (arising from costs of ICT investments) will result in firm-size differences in measured time requirements for administrative activities.

Economies of specialisation and organisation

The more administrative activities need to be performed, the larger the opportunities for and advantages of specialisation will be. Specialisation is an important determinant of efficiency increase in many work processes. Many authors suggest that in general, smaller firms are less specialised than larger firms (Daft, 1998; Nooteboom, 1993), and for the Netherlands this has been confirmed by Meijaard *et al.* (2002).

Larger firms are on average not only more specialised than smaller firms, but also apply different co-ordination mechanisms than smaller enterprises. These differences in co-ordination mechanisms reflect economies of organisation. Two important aspects of co-ordination are standardisation and formalisation. Both aspects are assumed to increase the efficiency of production processes by improving the co-ordination between the people and departments that are involved in these processes (Daft, 1998). Generally speaking, smaller firms are less standardised and less formalised than larger firms are (Daft, 1998; Meijaard *et al.*, 2002; Nooteboom, 1993).

Especially formalisation, which refers to the usage of written rules and procedures, may reduce the measured time requirements for administrative activities: formalisation implies that certain information is made explicit, while administrative activities requires explicit information to be sent to governments (or to enforcing institutes). If a large part of the information within an organisation is already available in an explicit form, then the required time to perform specific administrative activities may be less. This benefit of formalisation may be especially relevant for activities such as declaration of income

[1] Most software will not only be used for specific administrative activities that make up the administrative burden, but also for activities that are part of the normal business co-ordination and administration. This introduces economies of scope, which will be discussed later on in this section.

tax, filling in various forms (for such diverse policy areas as the General act on exceptional medical expenses AWBZ and the WKB Act on tax of games of chance) and filling in various authorizations (*e.g.* for authorization and hospital authorisation obligations from the Health Insurance Act ZFW).

Learning/experience effects

An increase in production of a new product (or a new administrative activity) leads to declining unit costs, since the people involved in the production grow more experienced and the organisation also learns from earlier faults or inefficiencies. The higher the firm's cumulative production is, the greater will normally be the experience and know-how, particular experience and know-how that cannot be achieved by formal education (tacit knowledge). This learning effect may be related to the general level of human capital of individual employees. Employees with a higher level of human capital may gain more experience in a shorter time period than employees that are endowed with less human capital (Cörvers, 1997). Therefore, human capital may affect both current level and future changes in activity times.

Learning and experience effects may result in economies of scale regarding administrative activities, to the extent in which small firms have to perform less administrative activities than large firms, or employees in small firms have less human capital than their colleagues in large firms. Whereas the second condition does indeed generally hold (Bernardt and Muller, 2000), the relationship between firm size and number of administrative activities is less straightforward, and depends strongly on the specific policy area.

The benefits of learning and experience effects are especially relevant for complex processes, such as becoming familiar with information obligations (which is distinguished as a separate activity in various policy areas, such as the Health Insurance Act ZFW and the Health Care Charges Act WTG) or checking agreements and declarations (which is distinguished as a separate activity in various obligations of the Health Insurance Act ZFW). It is, however, less likely that such benefits will occur for relatively simple activities such as receiving and filing information (which are part of almost all obligations). For such activities, only little experience seems to be required, and additional experience and/or higher educational levels will have only a very weak effect (if any) on the required time to perform these activities. This implies that the presence and magnitude of a firm-size effect on activity times may also differ between activities.

3.2.2 *Economies of scope*

Economies of scope are comparable to economies of scale. Whereas with economies of scale, average costs decrease with increased production of a specific product, economies of scope imply that average costs decrease with an increase in the number of different products made. Economies of scope occur when there are indivisibilities in inputs to the relevant production processes or when complementarities exist (for example in time and production technologies).

The fact that enterprises often have to perform several different administrative activities may result in economies of scope. The inputs that are required for different administrative activities (such as hard- and software, but also specific knowledge possessed by employees) are very similar. Indivisibilities, economies of specialisation and organisation, and learning and experience effects therefore not only contribute to economies of scale, but also to economies of scope.

3.2.3 *Diseconomies of scale and scope*

Diseconomies of scale and scope arise when an increase in total production volume (of either a single product or a line of multiple products) causes average costs of production to increase. The main sources of diseconomies of scale and scope can be interpreted as 'countervailing powers' of the sources of economies of scale and scope that have been discussed previously.

Especially the economies of specialisation and organisation may have a countervailing power that increases the average production costs of administrative activities. Specialisation, standardisation and formalisation may result in diseconomies of scale. For example, specialisation may mean that information that is required for specific administrative activities is no longer present with a single employee, but spread amongst various employees, requiring additional co-ordination to obtain the relevant information. Consequently, activities that involve gathering information (which is distinguished as a separate activity in various policy areas, such as the Health Insurance Act ZFW, General Act on exceptional medical expenses AWBZ and the WKB Act on tax of games of chance) may take more time in larger organizations. In addition, specific standards and formal requirements may require that certain documents (such as information obtained from governments regarding the obligation, or documents that have been filled in) must be stored in more than one location. This increases the time requirements for these administrative activities (which are part of almost all obligations).

3.2.4 *Wage differentials*

Smaller enterprises generally pay lower wages to (comparable) employees than larger firms do (Oosterbeek and Van Praag, 1995; Thurik, 1999). At the same time, capital tends to be more expensive (Fu *et al*., 2002). This implies that the profit-maximising mix of capital and labour will be different for small and large firms, with small firms choosing a production process that is more labour-intensive than with large firms (Thurik, 1999).

In the specific case of administrative activities, the existence of wage differentials may cause smaller firms to invest less in specific ICT solutions and opt for a more labour-intensive approach. Since labour costs are included in the definition of administrative burden, but investments in ICT are not, this will increase the administrative burden[1].

3.3 Conclusion

Economies of scale and scope may cause the average efficient time of performing administrative activities to be lower for larger enterprises. This effect is most likely to occur with relatively complex activities such as becoming familiar with information obligations or checking agreements and declarations. The combination of relatively lower wages and threshold costs of ICT investments may result in economies of scale for those activities that benefit from ICT investments.

For other activities, it is less clear whether activity times are related with firm size. Activities such as filling in forms or declarations may on the one hand benefit from the increased level of formalization that is generally found within larger enterprises, but at the same time the increased level of formalization can cause diseconomies of scale.

[1] As long as (ICT) investments do not lead to changes in tariffs.

Finally, a group of activities can be distinguished that does not require specific knowledge and is not likely to benefit from ICT investments. Examples of such activities are receiving, copying and sending information and documents for various obligations and policy areas. For these activities, it is unlikely that activity times are related to the number of employees.

Theory does not provide a clear and undisputed answer to the question whether the required time per activity is related to the number of employees. It is plausible that the presence and magnitude of a firm-size effect on activity times will differ between activities. In the next two chapters, we shall empirically investigate if a firm-size effect can be identified across a sample of various activities, and if so to which extent this can be explained by available indicators on economies of scale and scope.

4 Methodology

4.1 Introduction

In this chapter we discuss the methodology that has been applied to examine to which extent measured time requirements for individual activities are related with firm size. Since the choice for the dependent variable and the appropriate statistical methodology is determined by the available data, this chapter starts with a discussion of sample and data collection.

4.2 Sample and data collection

The MISTRAL approach to identifying and measuring activities is a time-intensive, and therefore costly, process. It has therefore been decided that the current study uses information obtained from two other projects applying the MISTRAL approach, rather than collecting data specifically for this study. These projects, carried out during 2001, involved two zero-base measurements in the fields of health care and tax collection, to determine the administrative burden of nine different policy areas within these fields.

A total of 27 organizations has been questioned, originating from different sectors and size classes (table 1). Interviews have been held with employees from all 27 organizations. In some instances, not all information could be obtained during the interview[1]. In those cases, a written questionnaire was sent and completed afterwards.

table 1 Sampled organizations by sector and size class

	Size class (nr. of employees)			
	1-9	*10-99*	*³100*	*Total*
Retail (SBI 52)	1	2		3
Business services (SBI 74)	1		4	5
Health care (SBI 85)	6	1	8	15
Culture, sport and recreation (SBI 92)			4	4
Total	8	3	16	27

Note: SBI refers to the Dutch industrial classification system Standaard BedrijfsIndeling.

Each organization has been questioned about one to four different policy areas. Within each of these policy areas, information has been obtained on all relevant obligations and messages (varying from one to seven messages per policy area[2]). For each message, information on the relevant activities has been obtained (varying from one to eleven activities per message). A list of all policy areas, obligations, messages and activities is presented in annex I. In total, 315 observations of internal activity times are available, covering 99 different activities.

[1] For example, if the interviewed employee had a high management position, he or she often had no detailed knowledge of activity times of individual activities.

[2] For each of the examined policy areas, each obligation requires only one message.

The zero-base measurements require that information is obtained regarding activity time, frequency and tariffs. In addition to these questions, which follow directly from the standard MISTRAL approach, the following information has been gathered specifically for this project:

- number of employees;
- experience (no. of years experience with specific activity);
- specialisation (indicator whether specific department(s) for administrative activities is (are) present);
- computerisation (indicator whether automated systems/computer software are used to perform the activity);
- system experience (experience with software, if applicable);
- sources (indicator whether more than one source needs to be consulted);
- adaptation (indicator whether adaptations and/or computations are required).

Information on the number of employees will be used to examine the presence of a direct relationship between firm size and measured time requirements. Information on experience and specialisation may be used to test more specifically for the presence of (dis)economies of scale and scope. The presence of automated systems and computer software may be seen as an indicator of the capital intensity of the 'production process' of performing administrative activities. This information can be used to control for the possibility that smaller firms apply relatively labour-intensive processes, for example due to wage differentials. Finally, differences in the number of sources to be consulted and in required adaptations may reflect differences in the level of complexity of the activities, which may also result in differences in measured activity times.

Information on the degree of computerisation and on system experience could only be obtained for a small minority of respondents. These variables are therefore excluded from further analysis.

4.3 Selection of the dependent variable

The objective of this study is to examine whether or not measured time requirements are independent of the number of employees.

Ideally, one would like to have data on a (limited) number of activities, with many observations per activity. These observations should represent firms from different sectors and size classes, who also show considerable variation in the other independent variables (as discussed in the previous section). To test for the presence of a size-class effect, one could then use regression techniques with activity time as the dependent variable, and the number of employees as one of the independent variables (along with the other variables discussed in the previous section). The availability of multiple observations for individual firms (amongst different activities) would allow to control for firm-specific effects.

Unfortunately, the available data does not allow for such an analysis. With a total of 315 observations for 99 activities, the average number of observations per activity is just over 3. This makes it impossible to estimate the presence of a firm-size effect for individual activities. Instead, a higher level of aggregation is required, where observations for different activities are combined into a single regression equation. This requires a certain standardization, to control for the fact that the average efficient time requirement will generally vary between activities. This standardization is achieved by de-

fining ‘relative activity time’ as the ratio between the measured time requirement and the average efficient time requirement (which is determined for each activity as part of the standard MISTRAL approach)[1].

To test for the presence of a size-class effect, regression analysis will be used to examine to which extent relative activity time depends upon the number of employees, as well as the variables experience, specialisation, sources and adaptation.

4.4 Selection of valid observations

Not all 315 observations can be used to test for firm-size effects. First of all, for 23 activities, the observations do not refer to actual measurements that have been conducted with the sampled firms, but are taken from CASH instead. These activities are mainly concerned with receiving, printing, filing and sending information for various messages (annex I provides information on which activities have been measured). This concerns 106 observations. According to the previous chapter, this implies that activities for which a firm-size effect is least likely to be present are excluded from the analysis.

Actual time measurements are available for 209 observations. However, the need to use standardized time measurements further reduces the number of valid observations. For 27 activities, only one observation is available. For the 27 associated observations, the average efficient time requirement and the average measured time requirement are both, by definition, equal to the observed time requirement. By definition, the relative activity time is equal to one. These observations cannot be used to examine differences in relative activity time, and are therefore excluded from further analysis.

Finally, 13 of the remaining 182 observations are excluded from the analysis, due to the fact that the number of employees is unknown for the observed organizations. The remaining 169 observations are valid observations that can be used in the analysis. Results of the analysis are presented in the next chapter.

[1] Alternatively, the ‘alternative relative activity time’ is defined as the ratio between the measured time requirement and the average measured time requirement for a specific activity. This alternative measure will be used as a check on the results of the multivariate analysis.

5 Results

5.1 Introduction

In this chapter we examine whether the relative activity time differs between smaller and larger enterprises, controlling for the effects of other potential determinants of relative activity time[1]. Activities for which a firm-size effect is least likely to exist are excluded from the analysis. Regarding the activities that are included, we are interested in the presence of an average firm-size effect rather than the existence of a firm-size effect for one or two specific activities.

In section 5.2 we present the average relative activity time per size class, followed by correlations between relative activity time and the independent variables. Next, multivariate analysis is applied: regression equations are estimated to determine the impact of the independent variables on the relative activity time, and we examine if there exists a relationship with firm size within our data set.

Both correlation and regression analysis find no support for any relationship between relative activity time and the number of employees. We shall discuss this finding in the final section of this chapter.

5.2 Correlation analysis

A first indication of possible firm-size effects can be obtained by examining the average relative activity times for different size classes. Table 2 includes averages for three size classes, not only for the relative activity time, but also for an alternative definition of relative activity time[2]. Although the averages differ somewhat between size classes, these differences are not significant. Variance analysis on both measurements for relative activity time cannot reject the hypothesis that relative activity time is independent of size class[3].

The correlation between the two measurements equals 0.90, which indicates that the average efficient time that is derived as part of the MISTRAL approach is strongly related to the actual time measurements[4]. Also, the alternative relative activity time is lower than the relative activity time, indicating that the average efficient time is generally below the average activity time that is actually measured. This is to be expected, since the average efficient time should exclude inefficient behaviour by firms.

[1] We assume that the extent to which firms exhibit inefficient behaviour is independent of firm size. Differences in measured time requirements between small and large firms are therefore interpreted as differences in average efficient time requirements.

[2] Alternative relative activity time is defined as the ratio between the measured time requirement and the average measured time requirement for a specific activity.

[3] This conclusion also holds if four size classes are distinguished instead of three: 1-9 employees, 10-49 employees, 50-249 employees and ≥250 employees.

[4] Both measurements share the same numerator, but differ in their denominator. The average efficient time is the denominator for the relative activity time, and the average actually measured time is the denominator for the alternative relative activity time.

table 2 Relative activity time, averages by size class

	Size class (nr. of employees)		
	1-9 empl.	*10-99 empl.*	*³100 empl.*
Relative activity time	1.40 (1.77)	1.72 (2.59)	1.49 (2.22)
Alternative relative activity time	0.98 (0.46)	1.06 (0.37)	1.07 (0.77)
N	73	23	73

Alternative relative activity time is defined as the ratio between the measured time requirement and the average measured time requirement for a specific activity.
Standard deviations are reported between brackets.

Another way to examine the relationship between relative activity time and firm size is to calculate the correlation between these variables. Table 3 reports correlations between relative activity time and several variables that might be related to relative activity time, including firm size. To allow for convex or concave relationships between relative activity time and firm size (measured by the number of employees), we also calculate correlations for the natural log of these variables.

table 3 Correlations

		1	2	3	4	5	6	7	8
Relative activity time	1	1							
Ln (rel. act. time)	2	.64*	1						
Firm size	3	.06	.05	1					
Ln (firm size)	4	.03	.06	.73*	1				
Experience	5	-.01	-.08	.31*	.11	1			
Specialisation	6	.05	.09	.32*	.33*	.04	1		
Sources	7	.10	.12	.20*	.27*	.20**	.38*	1	
Adaptation	8	.20**	.22*	.03	.14	-.02	.37*	.58*	1

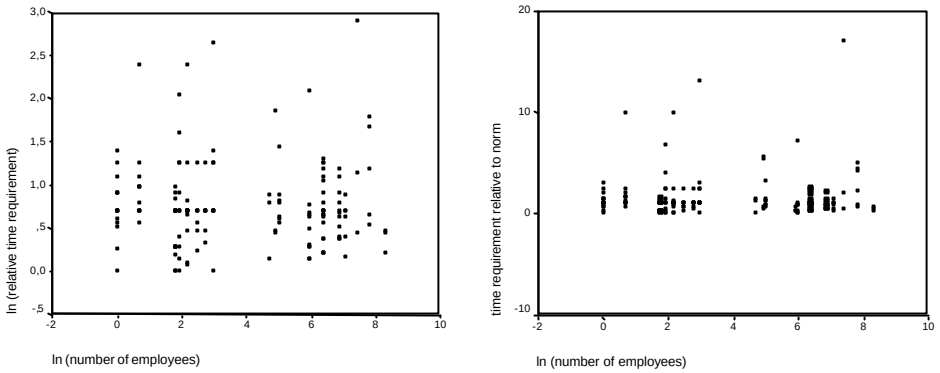
** Significant at the .01 level.*
*** Significant at the .05 level.*
The relation between dummy variables (specialisation, sources and adaptation) is measured by the Phi coefficient, which, for dummy variables, is identical to Pearson's correlation. Fisher's exact test is used to test for dependency between two dummy variables.

Again, the correlations presented in table 3 provide no support for a relationship between relative activity time and firm size. Only adaptation has a significant (positive) correlation with (the natural log of) relative activity time. If additional adaptations are required, the relative activity time tends to be higher[1]. Whether or not additional adaptations are required is independent of the size of the firm. Larger firms tend to have more relevant experience and are more likely to have specific department(s) for administrative activities. In addition, larger firms are more likely to consult more than one source. Neither of these variables has, however, a significant correlation with (the natural log of) relative activity time.

[1] The same conclusions hold for the alternative relative activity time.

Figure 2 presents scatter plots on both relative activity time and its natural log against the natural log of the number of employees. This figure illustrates the lack of any direct relationship between relative activity time and firm size.

figure 2 Observations on relative activity time and firm size



5.3 Regression analysis

To provide a final test on the relationship between relative activity time and firm size, multivariate analysis is required. To this end, we have performed ordinary least squares regressions, with relative activity time as dependent variable, and firm size, experience, specialisation, sources and adaptation as independent variables. To allow for a non-linear relationship between firm size and relative activity time, firm size is represented by the natural log of the number of employees and its square. Since we are interested in the presence of an average firm-size effect, we assume that the impact of firm size on relative activity time is identical for all activities.

The regression results confirm the finding from the correlation analysis (model 1 in table 4). There is no sign of any relationship between size and relative activity time. In addition, the other independent variables also exert no significant influence. This changes slightly if experience is removed from the equation. The reason for removing experience is that relatively many observations are missing for this variable[1]. Once experience is removed, the variable adaptation becomes significant (model 2 in table 4). Otherwise, none of the variables included in the regression equation has any significant impact on relative activity time.

The lack of explanatory power of models 1 and 2 is illustrated by the low proportion of explained variance (measured by R^2), as well as by the F test. This test statistic is used to test the null hypothesis that the parameters of all dependent variables are equal to zero. For both models, the significance of the F-test statistic is well above the 10% significance level, implying that the null hypothesis cannot be rejected.

[1] Only 114 valid observations are available for this variable, compared to 163 to 169 for the other variables included in model 1.

table 4 Regression estimates on relative activity time

	Model 1		*Model 2*	
Variable	*Estimate*	*Significance*	*Estimate*	*Significance*
Constant	1.56	0.03	0.56	0.02
Ln (no. of employees)	0.14	0.62	-0.15	0.58
Ln² (no. of employees)	-0.03	0.45	0.02	0.54
Experience	0.01	0.78		
Specialisation	0.91	0.54	-0.28	0.64
Sources	-0.29	0.53	-0.14	0.76
Adaptation	0.76	0.11	1.07	0.02
R^2	0.04		0.04	
F test	0.82	0.56	1.38	0.23
N	113		162	

To establish the robustness of model 2 , alternative specifications of model 2 have been estimated. First of all, the two main variables of this study (relative activity time and firm size) can each be represented in two ways (the original variable or its natural log)[1], resulting in four different combinations. These different specifications do not change the conclusion from the F test that none of the included parameters is significantly different from zero[2]. This conclusion also doesn't change if dummies representing sector and/or policy area are included.

Next, model 2 has been extended with 5 dummy variables representing the type of activity[3]. Again, four different specifications have been estimated, depending on the representation of relative activity time and firm size. This time, the F test rejects the joint hypothesis of insignificant model parameters for two of the four specifications (table 5). These specifications explain the natural log of the relative activity time, measuring size by either number of employees (model 3) or its natural log (model 4). Both models find a significant positive effect for adaptation, but only at a 10% confidence level. More important, however, is the finding that in neither of the two models firm size has a significant impact on relative activity time.

[1] Regarding relative activity time, it might be argued that one should calculate ln (relative activity time + 1) instead of ln (relative activity time), since logarithmic transformations tend to be different for numbers smaller than 1 and larger than 1. This doesn't change the conclusions presented in this chapter.

[2] Furthermore, these specifications have also been estimated using the alternative definition of relative activity time. This also doesn't change the conclusions.

[3] For about half of all observations it is possible to classify the observed activity into one of the basic administrative activities that are distinguished within CASH. Within the observations that are used for the analysis, five different basic administrative activities have been identified. Since not all observations are classified into one of these activities, it is possible to include dummy variables for each of these five categories.

table 5 Regression estimates on ln (relative activity time)

	Model 3		*Model 4*	
Variable	*Estimate*	*Significance*	*Estimate*	*Significance*
Constant	-0.004	0.89	0.0095	0.80
no. of employees	0.00024	0.52		
(no. of employees)²	0.00	0.84		
Ln (no. of employees)			-0.13	0.40
Ln² (no. of employees)			0.002	0.27
Specialisation	-0.11	0.75	-0.11	0.75
Sources	-0.14	0.60	-0.15	0.57
Adaptation	0.45	0.08	0.46	0.08
Dummy variables for specific activities:				
Becoming familiar with information obligations	-0.90	0.10	-0.91	0.09
Receiving information	-0.11	0.82	-0.006	0.89
Filling in or entering required information	-1.35	0.00	-1.32	0.00
Checking and possibly correcting results	0.28	0.29	0.30	0.26
Consultation	0.16	0.61	0.17	0.60
R^2	0.20		0.20	
F test	3.75	0.00	3.74	0.00
N	162		162	

To conclude, the regression estimations confirm the results from the bivariate analysis. Relative activity time tends to be higher for activities that require additional adaptations, but is independent of the size of the firm.

In a final set of regressions, model 2 is extended with firm dummies. These dummies are included to control for differences in time measurements between size classes. Differences between size classes occur if, for example, firms with more than 250 employees have a lower relative activity time than firms with less than 50 employees (for a specific activity). Differences within size classes occur if the number of employees is related to relative activity times within a specific size class (for example, for an activity that is only measured within firms with 1-9 employees, smaller firms may have a higher relative activity time than larger firms).

The specification of model 2 is aimed at examining scale effects between size classes: the number of employees is related to relative activity time across all size classes included in the data set. Differences in relative activity times within firms of comparable size are not likely to be identified, unless these differences are relatively large. Firm dummies can be used to examine the existence of size-class effects.

The inclusion of firm dummies in model 2 does not change any of the conclusions. The F test cannot reject the hypothesis that none of the included parameters is significantly different from zero. Not only is there no support for any relationship between firm size and relative activity times, but there is also no support for any systematic difference between the firms that are included in the sample.

5.4 Discussion

The MISTRAL approach is designed to measure administrative activities at such a disaggregated level that the average efficient time to fulfil each activity is independent of firm size. The results of the regression analysis can be interpreted as evidence that the MISTRAL approach has succeeded in this objective. However, due to limitations of the data used in this study, we have to remain cautious with drawing firm conclusions.

The main limitation of the available data is that only a few observations are available for each individual activity. Consequently, we cannot examine the relationship between firm size and actual activity times for a single activity. Instead, we have examined relative activity times for many different (types of) activities. This introduces the risk of comparing apples with oranges.

This risk is reduced somewhat by including dummies for different activity types (as we have done in models 3 and 4). This is, however, not without problems. First of all, determining the type of each activity turned out to be a complicated matter. It was not possible to determine a general typology of activities that could be applied to all activities that have been measured for this study. Instead, we have applied the CASH classification scheme, which could be used to classify about half of all observations. For the remaining observations, no classification of the type of activity has been made.

Next, including activity-type dummies only allows us to control for differences in the average relative activity time for different types of activities. The relation between firm size and relative activity time is still assumed to be identical for all activities included in the sample. It may be the case that for certain types of activities (*e.g.* receiving information) there is no firm-size effect, while for other types of activities (*e.g.* becoming familiar with information obligations) larger firms benefit from scale effects. For yet other activity types (such as filing information), (relative) activity times may be higher for larger firms due to the formal demands of their internal bureaucracy. With the available dataset it is not possible to account for these different effects that firm size may have on different types of activities.

6 Conclusions

One of the basic ideas of the MISTRAL approach is that administrative activities are defined at such a disaggregated level that the (standardized) average efficient time to fulfil each activity is independent of the number of employees. This paper has examined to which extent this basic idea is correct. Is the average efficient time required to perform specific administrative activities indeed independent of the number of employees within the firm?

Generally speaking, the existence of (dis)economies of scale and scope and wage differentials between small and large firms are often used to explain why production costs may differ between small and large firms. When these arguments are applied at the disaggregated level of administrative activities, it is however less clear whether one should expect activity times to be related to the number of employees within organizations. For relatively complex activities such as becoming familiar with information obligations or checking agreements and declarations, the activity time might be related to the number of employees. For activities such as receiving, copying and sending information and documents, no theoretical arguments have been identified that suggest a firm-size effect.

Using available data from specific policy areas in the fields of health care and tax collection, we have defined relative activity time as the ratio between the measured time requirement and the average efficient time requirement. Activities for which a firm-size effect is least likely to exist are excluded from the analysis.

Empirical analysis provides no support for any relationship between firm size and relative activity time within these policy areas. Variance analysis, correlation analysis and regression analysis all lead to the same conclusion: there is no relationship in our dataset between relative activity time and the number of employees.

In the previous chapter, we have discussed various limitations of the available dataset, especially the fact that only a few observations are available for each individual activity. Therefore, we have to be careful with our conclusion. Our current analysis only allows us to make general statements about the average relationship between firm size and (relative) activity time for the examined policy areas. We cannot conclude that there is no relationship between firm size and the average efficient time required to perform each individual administrative activity. Nor can we directly generalise our results to other policy areas. Our results do suggest, however, that generally speaking firm size has no noticeable relationship with the time requirements of performing the activities as defined by the MISTRAL approach.

The total administrative burden of a policy area depends upon time, tariff and frequency of the administrative activities induded in that policy area. The MISTRAL approach allows both tariff and frequency to vary with sector and size class, which implies that the administrative burden for each individual enterprise may differ between sectors and size classes. The required time to carry out specific activities is, however, assumed to be independent of firm size. Our analysis provides no indication of a relationship between firm size and time requirements for activities defined by the MISTRAL approach. The assumption of activity times being independent of size class is thus supported by this study.

Annex I Policy areas, obligations, messages and activities

The data used for this study has been collected within two other projects applying the MISTRAL approach for nine different policy areas, an overview of which is provided in table 6. Obligations, messages and activities for each of these policy areas are presented (in Dutch) in table 7. Since each of the obligations within these policy areas requires exactly one message to be sent, the obligations and messages are represented by a single column. The final column of this table indicates whether the required time for a specific activity has actually been measured (*i.e.* asked to the firm) or not (in which case time requirements are based upon CASH).

table 6 Policy areas included in this study

Abbreviation	*Name in Dutch*	*English translation*
IW	Invorderingswet	Tax collection act
AWR	Algemene wet inzake rijksbelastingen	General act on government taxes
WVB	Wet Vermogensbelasting	Act on wealth tax
SW	Successiewet	Act on Inheritance tax
NSW	Natuurschoonwet	Landscape and scenery Act
AWBZ	Algemene wet bijzondere ziektekosten	General act on exceptional medical expenses
ZFW	Ziekenfondswet	Health insurance act
WTG	Wet tarieven gezondheidszorg	Health care charges act
WKB	Wet kansspelbelasting	Act on tax on games of chance

table 7 Policy areas, obligations, messages and activities included in this study (in Dutch)

Policy area	*Obligation/message*	*Activity*	*Time measured*
IW	Ketenaansprakelijkheid	Administratie per onderaannemer	Yes
		Openen G-rekening	Yes
		Verzoek tot deblokkering	Yes
		Aansprakelijkheidsstelling	Yes
		Afhandeling bij Belastingdienst	Yes
		Verzoek om verklaring betalingsgedrag	Yes
	Bestuurdersaansprakelijkheid	Bestuurdersaansprakelijkheid	Yes
	Loonbeslag	Loonbeslag	Yes
AWR	Bezwaarschrift	Indienen bezwaarschrift	Yes
		Hoorzitting	Yes

Policy area	*Obligation/message*	*Activity*	*Time measured*
	Beroep	Indienen beroepsschrift	Yes
		Hoorzitting	Yes
		Ontvangst verzoek om vervanging door een schriftelijke uitspraak afschrift proces verbaal van de mondelinge uitspraak	Yes
	Hoger beroep	In hoger beroep gaan	Yes
		Ontvangst afschrift	Yes
WVB	Aangifte doen	Aangifte doen (makkelijk)	Yes
		Aangifte doen (moeilijk)	Yes
	Verzoek tot belasting-teruggaaf	Verzoek tot teruggaaf	Yes
SW	Aangifte doen	Aangifte doen IB	Yes
		Aangifte doen BV	Yes
		Afhandeling door notaris IB	Yes
	Vermindering aanslag	Vermindering aanslag	Yes
	Aanvraag uitstel van betaling	Uitstel van betaling (makkelijk)	Yes
	Kwijtschelding succes-sierecht	Kwijtschelding sussessierecht	Yes
NSW	Verzoek tot aanmerken landgoed	Verzoek tot aanmerken landgoed	Yes
AWBZ	Indicatiestelling	Verzamelen van gegevens	Yes
		Invullen formulier (arts)	Yes
		Invullen formulier (assistent)	Yes
		Tekenen formulier	Yes
		Versturen	No
		Besluit ontvangen	No
		Toewijzing zorg	No
		Archiveren	No
	Verkeerd Bed	Verkeerd Bed	Yes
	Zorgover-eenkomst/productie-afspraak	Zorgovereenkomst/productieafspraak	Yes
	EB Thuiszorg	EB Thuiszorg	Yes
	Herindicatie	Herindicatie	Yes
	Indicatiestelling ont-vangen	Indicatiestelling ontvangen	Yes
ZFW	Zorgovereenkomst	Ontvangen overeenkomst	No
		Controleren overeenkomst	Yes
		Intern overleg	Yes
		Tekenen contract	No

Policy area	*Obligation/message*	*Activity*	*Time measured*
		Verzenden	No
		Archiveren	No
	Machtigingen	Aanvraag machtiging opname	Yes
		Informatie opvragen	Yes
		Aanvraag machting AWBZ (arts)	Yes
		Aanvraag machting AWBZ (assistemt)	Yes
		Aanvraag machting fysio	Yes
		Invoeren gegevens	Yes
		Aanvraag aanvullende machtiging	Yes
		Controle ziekenfonds	Yes
	Declaraties	Mutatielijsten ziekenfonds	Yes
		Invoeren gegevens	Yes
		Declaraties opmaken	Yes
		Controleren	Yes
		Printen	No
		Declaraties indienen	No
		Doornemen controlelijst	Yes
		Contactmomenten met ziekenfonds	Yes
		Contactmomenten met ziekenfonds	Yes
		Geldverwerking	No
		Archiveren	No
	Informatie van koepel over tarieven	Informatie ontvangen	No
		Lezen en verwerken	Yes
		Archiveren	No
	Zorgover-eenkomst/productie-afspraak	Zorgovereenkomst	Yes
	Machtigingen zieken-huis	Machtigingen afdeling opname	Yes
		Machtigingen rest	Yes
	Declaraties zieken-huizen	Invullen	Yes
		Geldverwerking	Yes
		Uitvoeren van berekeningen	Yes
		Declaraties opmaken	Yes
WTG	Circulaires zieken-huizen	Lezen en verwerken	Yes
	Voorlopige nacalculatie ziekenhuizen	Voorlopige nacalculatie	Yes

Policy area	*Obligation/message*	*Activity*	*Time measured*
	Definitieve nacalculatie	Definitieve nacalculatie	Yes
	Circulaires AWBZ-instellingen	Circulaires CTG	Yes
	Voorlopige nacalculatie AWBZ-instellingen	Voorlopige nacalculatie	Yes
	Definitieve nacalculatie AWBZ-instellingen	Definitieve nacalculatie	Yes
WKB	Bijhouden register	Invoeren gegevens	Yes
	Aangifte	Ontvangen aangiftebiljet	No
		Verzamelen van gegevens	Yes
		Invullen biljet	Yes
		Kopie maken	No
		Versturen	No
		Archiveren	No
	Naheffing	Ontvangen naheffingsaanslag	Yes
		Verzamelen van gegevens	Yes
		Invullen biljet	Yes
		Kopie maken	No
		Versturen	No
		Archiveren	No
	Nota verstrekken	Verzoek om kwitantie	Yes
		Invullen kwitantie	Yes
		Versturen kwitantie	No
		Ontvangstkwitantie	No
		Bijhouden in Excel	Yes
		Archiveren	No

References

Audretsch, D.B., and A.R. Thurik, 'What is new about the new economy: sources of growth in the managed and entrepreneurial economies'*, Industrial and Corporate Change*, vol. 10, 2001

Bernardt, Y., and R. Muller, *Determinants of firm size; a survey of literature,* Research Report 9913, EIM, Zoetermeer, 2000

Boog, J.J., M. Jansen and M.J.F. Tom, *Monitor administratieve lasten bedrijven 2002,* EIM Report A200118, 2002

Cörvers, F., 'The impact of human capital on labour productivity in manufacturing sectors of the European Union', *Applied Economics*, vol. 29, 1997

De Wit, G., and A.F.M. Nijsen, 'Administratie tot last van het algemeen' (Administration a common burden), *Economisch Statistische Berichten*, vol. 4353, 2002

Daft, R.L., *Essentials of organization theory and design*, South-Western College Publishing, Cincinnati, Ohio, 1998

EIM, *The European Observatory for SMEs*, EIM/ENSR Third Annual Report, Zoetermeer, 1995

Fu, T., M. Ke and Y. Huang, 'Capital growth, financing source and profitability of small businesses: evidence from Taiwan enterprises', *Small Business Economics*, vol. 18, no. 4, 2002

Meijaard, J., M. Mosselman, K.F. Frederiks and M.J. Brand, *Organisatietypen in het MKB,* Strategische Verkenning B200105, EIM, Zoetermeer, 2002

Nooteboom, B., 'Firm-size effects on transaction costs', *Small Business Economics*, vol. 5, 1993

Nijsen, A., *Information obligations in the Dutch constitutional state; compliance costs for business,* Strategic Study B0001, EIM, Zoetermeer, 2000

Nijsen, A., *Dansen met de Octopus,* Eburon, Delft, 2003

Nijsen, A., and N. Vellinga, *MISTRAL - a model to measure the administrative burden of businesses,* Research Report 0110, EIM, Zoetermeer, 2002

OECD, *Regulatory Impact Analysis, Best practices in OECD countries,* OECD/PUMA, Paris, 1997

Oosterbeek, H., and M. van Praag, 'Firm size wage differentials in the Netherlands'*, Small Business Economics*, vol. 8, 1995

Thurik, A.R., 'Entrepreneurship, industrial transformation, and growth'*, Advances in the Study of Entrepreneurship, Innovation, and Economic Growth*, vol. 11, 1999