

# Summary

## A forecasting model of the Dutch justice chain: civil law and administrative law

In 2003 the ministers of Justice, Finance and Internal Affairs agreed that the ministry of Justice would take the lead in developing a model for the complete justice chain, the *forecasting model of the Dutch justice chain* (PMJ). The Dutch justice chain consists of three pillars: the criminal justice chain, the civil law chain and the administrative law chain. In 2004, the WODC published a first version of the model for the criminal justice chain. The model for the criminal justice chain includes the places under civil law in the judicial institutions for juveniles, as well as traffic offences and custody of illegal foreigners, which fall under administrative law.

Mainly from its task of providing a budget proposal for the judiciary, the Council for the Judiciary (Raad voor de rechtspraak) also felt the need for a model that forecasts the capacity needed in the civil and administrative sectors of the judiciary. Such a model would replace the models of trend extrapolation that are currently being used. For this reason, the WODC and the Council for the Judiciary have decided to jointly develop a forecasting model for the chains of civil and administrative law. This report describes a first version of the model.

### *Aim of the model*

The forecasting model aims to provide a better basis for the yearly budget of the Ministry of Justice, and to make the process of preparing the budget more transparent. The model should produce reliable forecasts of the need for capacity in different parts of the judicial chain. This way, the needed capacity can be translated into financial consequences for the budget. The forecasts that are produced using the PMJ model are *policy neutral*. This means that developments as a result of recently implemented or future policy interventions that are not yet visible in the data that are used, are excluded from the model. These effects have to be listed and quantified separately.

The forecasts that are produced by the model for the criminal justice chain have already been used as a basis for the budget of the ministry. In the future, forecasts produced by the model for the civil law chain and administrative law chain will also be used to this end.

### *Structure of the model*

Since the process of developing a model for the complete justice chain takes time, this first version of a model for the civil law chain and administrative law chain focuses exclusively on the judiciary. Other parts of the chains, such as judicial advice, will be added in later versions of the model. The major difference between the forecasting model for the criminal justice chain and the model for the civil and administrative sectors is that the latter produces forecasts for the 19 district courts, whereas the former

provides forecasts on a national level. The first reason for this difference is that for the civil and administrative sectors of the judiciary, data are only available for a limited number of years (usually 10 to 15). To be able to build a model that produces reliable forecasts in that case, it is advisable to consider regional variation in the data as well as temporal variation. Here, regional variation is provided by modelling the developments at the level of the different district courts. A second reason for building a regional model is that the Council for the Judiciary prefers to have forecasts for the different district courts, as a basis for the budget of these courts.

This first version of the forecasting model only takes the inflow of judicial procedures into account. The analysis of procedures at the Courts of Appeal, Supreme Court and other special tribunals is limited to the modelling of appeal ratios. These appeal ratios are defined as the ratio between the inflow of procedures at the appeal courts and the outflow of cases from the lower courts. The current model therefore focuses on providing reliable forecasts of the inflow of judicial procedures, for a number of different types of procedures, at the level of the different courts. For the civil law chain, these courts are the 19 district courts, five Courts of Appeal and the Supreme Court. Thirteen types of procedures in the first instance are distinguished, and four types of appeal and cassation. For the administrative sector, the 19 district courts, five Courts of Appeal, the Supreme Court, the Central Appeals Tribunal and the Council of State all play a role in the handling of judicial procedures. Here, seven types of procedures in the first instance are distinguished, and five types of appeal and cassation.

### *Methodology*

The forecasting model of the Dutch justice chain has the form of a regression model that both explains the past and forecasts the future. At the basis of the PMJ model are relations between the inflow of judicial procedures on the one hand, and developments in society and the role of other actors in the chains of civil and administrative law on the other hand.

The model is estimated using yearly time series of the appeal to the judiciary in the civil and administrative sectors, for a number of different types of procedures at a number of different courts. In order to estimate the model, it is crucial to identify the factors that determine the inflow of the different types of judicial procedures. Using econometric analysis, it is examined whether the relation between the explanatory variables and the inflow of procedures is statistically significant. The direction and magnitude of the relation is determined using statistical techniques. Since data on a regional level form the basis of the model, data on the explanatory variables also need to be collected at this level. However, in a number of cases variables that are not available regionally or do not vary between regions have been used in the model. For example, the court fee for a certain type of procedure is the same for every district court. In total, 21 explanatory variables have been selected for possible use in the forecasting model.

### *Results*

For 12 of the 14 types of procedures in the civil sector, it has been possible to build a model specification consisting of at least one explanatory variable. Only for procedures concerning divorce and social security, a satisfactory specification could not be found. Table 1 lists the explanatory variables that have been included in the model

specifications of the 12 types of civil procedures, along with a summary of the estimation results. The table shows how often the variables have been selected. In addition to the 21 explanatory variables that are described above, an unexplained trend term and, if relevant, a lagged dependent variable have also been included in the table.

Table 1. Selected variables, estimated signs and (un)weighted elasticities; model specifications for the civil sector

	Expected sign	Number of times positive	Number of times negative	Unweighted elasticity	Weighted elasticity
<i>Unexplained trend term</i>	- / +	8	1	0.03	0.04
<i>Problem frequency</i>					
Gross value added	- / +	5	0	0.3	0.4
Unemployment benefits	+	7	0	0.1	0.2
Disability benefits	+	0	0	0.0	0.0
Social security	+	0	1	0.0	0.0
Benefits, total	+	0	0	0.0	0.0
Number of people divorcing	+	1	2	0.0	0.0
Age: share of juveniles (0-15 years)	-	0	0	0.0	0.0
Age: share of labour force (15-65 years)	+	0	0	0.0	0.0
Age: share of elderly (65+ years)	-	0	0	0.0	0.0
<i>Social cohesion</i>					
Population density	- / +	0	2	-0.1	-0.2
Composition of households: share of single persons	+	0	0	0.0	0.0
Number of immigrants	+	0	0	0.0	0.0
Mobility	+	0	0	0.0	0.0
Migration	+	0	0	0.0	0.0
Brutalisation of society	+	0	0	0.0	0.0
<i>Supply of judicial advice</i>					
Number of lawyers	+	0	0	0.0	0.0
Legal expenses insurances	+	0	0	0.0	0.0
<i>Cost of a procedure</i>					
Court fees	-	0	2	-0.1	-0.1
Average cost of subsidised lawyer	-	0	4	-0.1	0.0
Average cost of commercial lawyer	-	0	1	-0.2	0.0
Average cost of lawyer	-	0	1	-0.1	0.0
<i>Lagged dependent variable</i>		0	7	-0.2	-0.2

The results show how many times a variable has a positive or negative effect on the inflow of the different types of judicial procedures. The size of the effect is also displayed, using two different types of *elasticities*. The *unweighted elasticity* is a measure of the long-term effect that a variable has on the inflow of judicial procedures, averaged

over all types of procedures. It is defined as the % change in the inflow of judicial procedures that is related to a 1% increase in the relevant variable. The *weighted elasticity* also measures the effect of an increase in the variable on the inflow of procedures, but uses the share of a certain type of procedure in the total number of procedures in 2003 as weights. The weighted elasticity describes the estimated long-term effect that a 1% increase in the relevant variable has on the total number of civil procedures in the analysis.

From table 1 it is clear that the variables regarding problem frequency play the most important role in the civil part of the model. Especially the economic variables have high scores. The variables with respect to the cost of a procedure come in second. The other variables do not seem to have a significant impact on the inflow of civil procedures. Many of the model specifications contain a clear, positive trend that is not explained by the variables included in the model. In a number of cases, adding the inflow in the previous year to the specification also helps to increase the explanatory power of the model.

For the administrative sector of the judiciary, a model specification containing at least one explanatory variable could be found for all seven types of procedures in the first instance. Table 2 shows the effects that the selected variables have on the inflow of procedures in the administrative courts.

As seen in the results for the civil law chain, the variables regarding problem frequency, and specifically the economic variables, are the most important ones to have an impact on the inflow of procedures in the administrative courts. The variables concerning the cost of a procedure and the social cohesion play a modest role. In many of the specifications, an unexplained trend term is included. In most cases, this trend is a negative one.

For procedures in the Courts of Appeal, the Supreme Court and the special tribunals, it has not been possible to build a model that explains the appeal ratios using the selected explanatory variables for either the civil or the administrative sector. For these procedures, only trend terms play a (modest) role in the model.

In this report, the quality of the specifications that have been developed is assessed by two criteria: the *explanatory power* and the *accuracy of forecasts*. In order to establish the explanatory power of the model, we have examined whether the identified relations are in accordance with theoretical expectations. As it turns out, this is mainly the case for the economic variables and the variables concerning the cost of a procedure. For the other types of variables, consistency with the expected effects is less clear. For the specifications in the administrative sector, the sign of the coefficient for variables regarding the cost of a procedure and the social cohesion is even opposite to theoretical expectations. The most important indicator of the quality of the model is the *goodness of fit statistic*  $R^2$ . This statistic, that describes which part of the variation in the development of the inflow of judicial procedures can be attributed to the selected explanatory variables in the forecasting model, lies roughly between 25 and 40%. However, it fluctuates strongly between specifications.

Table 2. Selected variables, estimated signs and (un)weighted elasticities; model specifications for the administrative sector

	Expected sign	Number of times positive	Number of times negative	Unweighted elasticity	Weighted elasticity
<i>Unexplained trend term</i>	- / +	1	3	-0.03	-0.01
<i>Problem frequency</i>					
Gross value added	- / +	1	1	0.3	0.5
Unemployment benefits	+	2	2	0.1	-0.2
Disability benefits	+	0	1	-1.0	-2.0
Social security	+	0	0	0.0	0.0
Benefits, total	+	1	0	0.8	0.1
Number of people divorcing	+	1	0	0.0	0.1
Age: share of juveniles (0-15 years)	-	1	0	7.1	3.3
Age: share of labour force (15-65 years)	+	0	0	0.0	0.0
Age: share of elderly (65+ years)	-	0	0	0.0	0.0
<i>Social cohesion</i>					
Population density	- / +	0	0	0.0	0.0
Composition of households: share of single persons	+	0	0	0.0	0.0
Number of immigrants	+	0	0	0.0	0.0
Mobility	+	0	1	-0.1	-0.2
Migration	+	0	0	0.0	0.0
Brutalisation of society	+	0	0	0.0	0.0
<i>Supply of judicial advice</i>					
Number of lawyers	+	0	0	0.0	0.0
Legal expenses insurances	+	0	0	0.0	0.0
<i>Cost of a procedure</i>					
Court fees	-	0	0	0.0	0.0
Average cost of subsidised lawyer	-	0	0	0.0	0.0
Average cost of commercial lawyer	-	0	0	0.0	0.0
Average cost of lawyer	-	1	1	0.2	0.5
<i>Lagged dependent variable</i>	- / +	0	2	-0.1	-0.1

A high value of the goodness of fit statistic does not guarantee that the model also provides good forecasts. For this reason, the accuracy of the forecasts has been measured to evaluate the quality of the model. A forecasting process has been simulated, and the results using different methods of forecasting – including the PMJ model – have been compared. In general, using the PMJ model results in forecasting errors that are smaller than those using the current methods of trend extrapolation. This result holds for both the civil and the administrative sector. However, the average forecasting errors are large for all methods used in the comparison. For the types of procedures that

contain a lot of cases, the forecasting errors tend to be smaller than for the types of procedures that contain smaller numbers of cases.

#### *Future research*

The forecasting model for the civil and administrative law chains described in this report is obviously a first version. The model will be improved and extended in the next few years. More research is needed in order to increase the explanatory power and the forecasting power. Especially an analysis of the impact of legislation, policy and jurisprudence on the development of judicial procedures is important, as well as further assessments of the econometric quality of the model. The model will be extended to include (subsidised and non-subsidised) legal aid and procedures relating to aliens. Research will be carried out on how to include stocks that are present in the system and the time it takes to complete a procedure into the model, and how to explicitly model the outflow of procedures. Furthermore, the forecasting model for the civil and administrative chains will be linked to the model for the criminal justice chain where necessary.