SUMMARY

The central task of this study is the description and explanation of *regional differences in the length of stay in hospital* for a number of frequently encountered surgical procedures in the Netherlands. In the, mainly English-language, literature on variation in hospital treatment it is implicitly assumed that the nature and extent of hospital treatment which people receive is dependent on processes in the *region* in which they live and in which the treatment is provided. Is this implicit assumption correct or are there sub-regional processes that are much more important?
As reported in chapter 1, it turns out that a description of (regional) differences in length of hospital stay in which differences in state of health between patients are taken into account and in which the various levels of analysis - region, hospital, hospital ward and doctor - are critically examined is lacking in the Netherlands.
It also turns out that no serious attempt to explain regional differences on the basis of the behavior of the actors involved (doctor, patient, hospital management) could be found in the literature. The theoretical point of departure of this study is namely that the basis of differences in length of stay lies in the behavior of goal-oriented individuals, especially doctors and patients, whose behavior is influenced by their circumstances. Given these points of departure, it may well be that the regional level is *too high a level of analysis*.

An extensive description of regional differences in the length of hospitalization for ten surgical procedures in the Netherlands is presented in **chapter 2**. The data used were supplied by the VNZ (Vereniging van Nederlandse Zorgverzekeraars), and are from the years 1982 and 1986. The extent of regional differences was examined per surgical procedure. Four procedures - the meniscus extirpation, the squint-correction operation, the nasal septum operation and the tonsillectomy (16 years and older) - displayed considerable regional differences in duration of hospitalization. The differences were noticeably smaller for the other procedures. Following this, the size of the differences in duration of hospitalization was examined *within regions between hospitals*.
The outcome of the intra-regional analyses is that the regional differences are indeed pale and sharply reduced when the hospital is taken as the unit of analysis. The differences between hospitals within the regions are great. It was concluded that the causes of differences in length of stay should therefore not be sought at the regional level - as is usual in much of the Anglo-saxon literature on the subject - but at a lower level of analysis: the hospital.

The question was then posed whether the hospital level might not also be too high a level of analysis. This question was examined by looking at whether within the same hospital the different surgical procedures, largely performed on different wards, have systematically short or long durations of hospitalization. If this is indeed the case, the causes of differences in duration of stay must be sought at the level of the hospital. If it is not the case, and short and long durations of stay occur simultaneously within the same hospital, then the appropriate level of analysis is the hospital ward. The result of the analysis showed that hospitals with a long average duration of stay for one specific procedure did not have a systematically long duration of stay for other procedures. However, for the ward level within hospitals we did find such a systematic effort. We conclude from this that differences in length of stay occur at the level of the hospital ward; close to the level of the individuals involved. Important differences in (work)conditions probably occur at this level, resulting in differences in length of stay decisions. This is not to say that circumstances or restrictions at the regional or hospital levels are unimportant, but that for the construction of a theoretical model, the ward level forms the better starting point. The explanatory question is thus adapted and reads as follows:

> *Why does the average length of hospital stay for procedure-specific groups of patients differ between hospital wards in the Netherlands and what is the role of medical specialists and other relevant actors in bringing about these differences?*

The theoretical model that is supposed to answer this question is presented in **chapter 3**. This chapter begins with an introduction of the method of theoretical analysis.
In constructing the theoretical model, we focus on three actors: the doctor, the patient and the hospital management. All three are supposedly involved in bringing about the (differences in) length of stay. The behavior of the central decision-maker, the doctor, is modelled stepwise in sections 3.4 to 3.9. The behavior of the hospital management, a collective actor, is not explicitly modelled but included in the form of restraints on the doctor's behavior. Initially it is also assumed (for simplicity's sake) that patients have no influence on the doctor's length-of-stay decision. This assumption is subsequently relaxed and the possible differences between patients concerning their influence are specified.
The model-building is based on Lindenberg's theory of social production functions: people (in this case doctors) pursue two general goals: *social*

approval and physical well-being and in order to realize these goals people choose instrumental goals that are available in their action situations. An example is the generation of income, which is in our money-economy an instrument to procure physical well-being. For the specific problem of this study, the length-of-stay decision of doctors in hospitals, the following two instrumental goals, among others, are formulated:
1) *avoiding criticism* in order to maintain social approval from colleagues and patients;
2) *generation of income* in order to increase physical well-being.
These instrumental goals are, in turn, linked to lower level instrumental goals or 'production conditions' under which doctors make their decisions concerning patients' length of hospitalization: *the degree of bed shortage, the doctor's remuneration system, the patient's occupational status.* This stepwise process of theoretical analysis resulted in ten hypotheses, which are summarized below. In the last two hypotheses the patient is explicitly included as an actor in the theoretical analyses.

hypothesis 1: *in order to avoid loss of social approval among colleagues, the individual doctor will choose a length of stay for the patient which is close to the local customary procedure-specific length of stay - the local standard.*
hypothesis 2: *the doctor who works in more than one hospital will, in order to avoid loss of social approval, choose a length of stay close to the local standard of the hospital where he/she is working at the time.*
hypothesis 3: *if the number of locally available beds is low and the doctor is paid per procedure, a length of stay will be chosen which is close(r) to the length-of-stay minimum.*
hypothesis 4: *if the number of locally available beds is low and the doctor is on a salary contract for a hospital, a length of stay is chosen which is further removed (in comparison to hypothesis 3) from the length-of-stay minimum. In periods of increasing bed shortage, longer average waiting lists occur for salaried doctors.*
hypothesis 5: *if the local supply of available beds is plentiful, doctors choose - regardless of the remuneration system - a length of stay which contributes to the maximum utilization of the beds, in connection with the goal of social approval. We expect this mechanism to be stronger in 1982 than in 1986 for reasons of rule change.*
hypothesis 6: *as a result of a 'competition for beds' between hospital wards (within hospitals), it is likely that the supply of available beds will differ between wards, as a result of which the order of ranking of length of stay of various surgical procedures performed in different wards is not systematically the same within the same hospital.*

hypothesis 7: *in periods of bed shortage, a shorter length-of-stay minimum (and thus a shorter actual length of stay) will be chosen if:*
- substitution possibilities exist for a part of the hospital stay outside the hospital providing treatment and/or
- the degree of specialization of the doctor involved is higher and/or
- the level of specialization of the involved hospital's services is higher.
hypothesis 8: *in periods of bed shortage, the length of stay in the ward involved will be longer if:*
- the geographical distance between alternative hospitals in which salaried doctors work and the hospital involved is shorter and/or
- the substitution possibilities for non-clinical procedures within the hospital are plentiful.
hypothesis 9: *given a plentiful supply of available beds, the doctor will experience the more resistance from the patient to a choice for a longer duration of stay the longer the length-of-stay minimum for the surgical procedure for which the patient was admitted.*
hypothesis 10: *when there is a plentiful supply of beds available and there is a long procedure-specific length-of-stay minimum, the chance that the patient will criticize the doctor's length-of-stay decision is the greater the higher his/her socio-cultural and economic occupational status.*

These ten hypotheses are tested in four empirical studies, spread over the next four chapters. Chapter 4 is a 'route description' for the manner in which the empirical testing is organized.

Hypothesis 10, concerning the influence of the patient on the choice of the duration of hospitalization, is dealt with first, in **chapter 5**. This hypothesis is tested before hypotheses 1 to 8 because the outcome of the test has consequences for the other three empirical studies. The analyses in this chapter reveal that hypothesis 10 could not be confirmed. Patients who have a clear economic motive to negotiate about 'accelerated discharge', *and* who are capable of this because of a relatively high level of social assertiveness, stay in hospital just as long as patients without an economic motive and/ or a high level of social assertiveness. We concluded from this that our assumption that the doctor is the central actor in arriving at the length of stay decision does not need to be adjusted. The analyses in chapter 5 have the following consequences for the rest of the empirical studies in this book:
1) differences in procedure-specific length of stay are all the more related to the decision-making behavior of the doctor, and 2) because no differences were found in procedure-specific length of stay between publicly and privately insured patients - something which was also examined in this

chapter - the generalisability of the results of chapters 2, 6, 7 and 8, which were based exclusively on patient records of the publicly insured (VNZ), is not restricted to only publicly insured patients.
Hypothesis 9 could not be empirically tested in this study because of data restrictions. However chapter 5 does say something about the tenability of this hypothesis, because hypotheses 9 and 10 are closely related. The question is: should hypothesis 9 be rejected together with hypothesis 10. Is it true that, if patients do not differ in their influence on the length of stay, they have no influence on the length of stay? Clearly one those not follow from the other. At this stage, we would like to assume the patient's influence for the explanation of the fact that the procedures requiring a lengthy stay vary *less* in the length of stay than the procedures requiring a shorter stay. At some point, the patient's desire to return to their homes will curb the doctor's desire to keep the patient longer. However, we do not at this stage have access to the sort of data which would be needed to test this hypothesis.

Hypotheses 1 and 2, concerning the mechanism underlying the doctor's orientation towards the local standard, were tested in **chapter 6**. We modelled the situation where doctors gear their own medical practice to that of colleagues within the same hospital organization in order to maintain their social approval among colleagues. Our prediction was confirmed empirically: doctors conform to the local length of stay standard and thus to the length of stay decision of direct colleagues, within their 'own' hospital. The variation in procedure-specific length of stay choices between doctors within hospitals is slight (research hypothesis 1). We then subjected the mechanism 'orientation to a local standard' to another empirical test by looking at the behavior of doctors working in more than one hospital. Hypothesis 2 was also confirmed: where doctors work in different hospitals with different (procedure-specific) lengths of stay, *intra-doctor variation* can be observed, that is to say that doctors choose a length of stay in the direction of the standard of the hospital in which they are working at the time.

After showing in chapter 6 that individual doctors *within* hospitals differ scarcely or not at all in their length of stay decisions, we show in **chapter 7** that the length-of-stay standard differs *between* hospitals/wards as the availability of beds varies. Besides the fact that not reducing the length of stay in the case of a bed shortage has unfavorable effects on the level of income of doctors who are paid per procedure, the explanatory mechanism (in the case of a plentiful supply of beds) is once again based on the role of social approval, but now on the approval gain which depends on jointly protecting a wards's allotments, which, in turn, means not leaving available

beds unused.
Hypothesis 3/5 (a combination of theoretical hypotheses 3 and 5), and hypotheses 7 and 8 for secondary restrictions, describe and predict this expectation. We predicted a positive relation: more available hospital beds means a lengthier stay for patients. On the basis of the research results using multi-level analysis we conclude:
1) the expected positive relation between the availability of beds - for the short and long term - and patients' length of stay was confirmed for all examined surgical procedures, but the effect was weaker than anticipated, and
2) the prediction concerning the secondary restrictions (hypotheses 7 and 8) were by and large not confirmed. It is striking that in the case of bed shortage in the hospital ward the length of stay was not systematically influenced by internal or external substitution possibilities for a part of the hospital stay.
Another important result from chapter 7 is that the size of the hospital does not appear to be related to patients' length of stay: the variation is just as great in small hospitals as in large hospitals.
Finally, a negative relation was (predicted and) found between the degree of specialization of the doctor and the length of patients' hospitalization: more specialized doctors choose on average a shorter stay.

In **chapter 8** we found empirical support for the (combined) hypothesis 3/4: salaried doctors choose a longer duration of stay on average in the case of bed shortage than doctors who are paid per procedure. However, because of the limitations of the empirical material and the small number of cases, it is necessary to regard this result with some caution. It is possible that the relative disinclination of salaried doctors to apply rationing in the case of bed shortage leads to longer waiting lists, but this is empirically untestable given the data available for this study.

After a summary, the book closes with a discussion in **chapter 9**. Firstly, the gain due to the theory-driven approach in the undertaken study is discussed. Secondly, we discuss the consequences of the empirical results for the theoretical model. Thirdly, we conclude that the application of multi-level analysis, chapter 7, is an appropriate technique to cope with the problems which arise when hierarchically nested data are used. Finally, some policy implications and instruments to cope with the 'variation in medical practice'-phenomenon in the near future are discussed.