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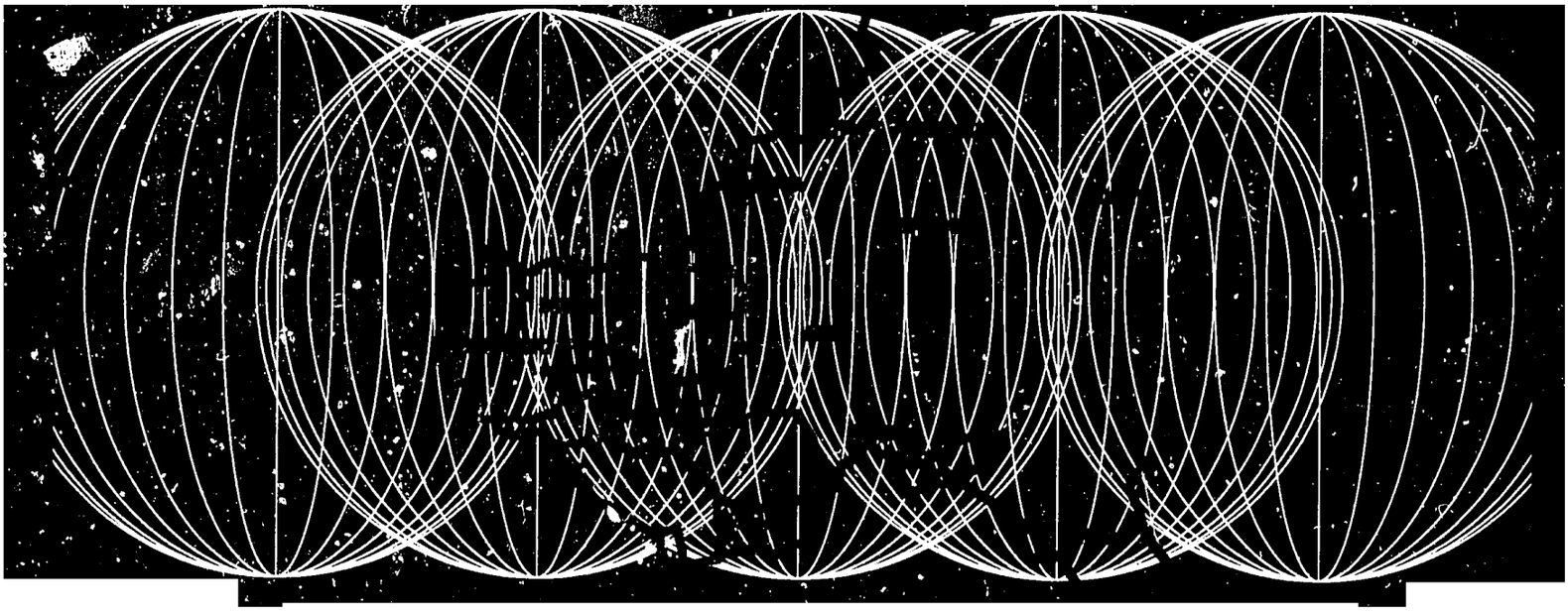
FROM PLANNING TO MARKETS
HOUSING IN EASTERN EUROPE



THE URBAN INSTITUTE
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HOUSING COSTS AND AFFORDABILITY IN CZECHOSLOVAKIA: THE OPPORTUNITY FOR PRIVATE HOME BUILDING

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EXECUTIVE SUMMARY

For the forty years preceding Czechoslovakia's velvet revolution, the state (and cooperatives strongly influenced by the state) had produced virtually only one type of housing: multi-story concrete-panel apartment buildings. The popular view was that the quality of those buildings was inadequate from the start and that, with severely deficient maintenance, most of them had deteriorated rapidly. The government allocation system which denied families free choice as to where they could live also contributed to dissatisfaction with housing conditions.

Perhaps even more important was that the system frustrated the strong desires of many city dwellers (the most rapidly growing component of the population) to own their own homes. Czechoslovakia does have a large number of owner-occupied single family homes, but most are in rural areas. Such homes make up only 12.5 percent of the housing stock in Prague and 10.4 percent in Bratislava, compared to, for example, 58 percent on average in the cities of the United States.

At any rate, popular resentment against the panel buildings--as symbols of the rigidity of the old regime--remains strong. The new governments (at the federal level as well as in both republics) have announced their intention to create a market-oriented housing system that would produce freedom of choice and a broader array of housing options.

An argument has been made of late, however, that would seem to threaten this vision: namely, that housing costs are so high--particularly for single-family homes--that new private sector options will not be affordable to enough of the population to warrant policies promoting them. The conclusion they seem to imply is that the old communal housing approach (and panel apartments) will have to be relied upon again.

This report shows that this argument is invalid--to the extent that it artificially constrains choices for policy makers, it is a dangerous myth. We find that:

- While, to be sure, the majority of urban households could not afford to buy a new house of their own today without large subsidies, the number that have sufficient income to do so (even after the major price increases of 1991) is significant.

- Competitive private builders will find it profitable to provide housing for this group and, with appropriate facilitating actions by governments, it is likely that they will introduce efficiencies that will substantially further reduce the cost of new housing in relation to incomes as they do so. If this occurs, the number able to afford a new house should expand markedly.

- The production of new urban homes for large numbers in the middle and higher income groups will significantly relieve pressures in the existing housing stock--perhaps doing more than anything else possible at this point to allow lower income families to improve their own housing conditions.

APPROACH

This analysis used available data, in conjunction with ranges of assumptions, to assess the general magnitudes of cost-affordability relationships in the Czech and Slovak Federative Republic (CSFR) today. Its framework also offers guidance as to how affordability for individual projects could be analyzed once more detailed data on costs and consumer preferences have been assembled.

The work proceeded in three stages. First, experienced construction cost estimators (in both the Czech and the Slovak Republics) prepared estimates of the costs (as of late 1991) of 12 residential developments, with varying characteristics, for which designs were already available. Using those costs as a base, they then worked with us to provide estimates for several prototype residential developments. Estimated costs for these prototypes take into account the substantial increases in material prices implemented in January 1991, but they assume traditional institutional arrangements and procedures. Also, the estimating methods applied, while they follow techniques used with surprising uniformity by both public and private builders in the CSFR at this point, clearly overstate true requirements (among other things, because of padding built into standard formulas). Thus these costs should be considerably above those that can be expected once a truly competitive market exists. (See Chapter 1)

Second, we obtained data on the income distribution of all households from the 1988 *Mikrocensus*, and had CSFR analysts make estimates that update income levels to 1991. Data are available separately for urban and rural areas and include all sources of household income (not just wages and government support payments). We then calculated the share of all households that could afford the different prototypes, given

alternative assumptions about financing and the percentage of income the households would be willing and able to pay for housing. (See Chapter 2).

Third, we examined the components of today's costs in more detail to identify areas where important cost reductions appear possible. Based on this analysis, we suggest additional research and preliminary government actions that would lead toward substantial reductions in housing development costs in the future. (See Chapter 3).

MAIN FINDINGS AND CONCLUSIONS

Four basic housing types were analyzed: a single family house, a row house, a four-unit low-rise apartment building, and a high-rise concrete panel apartment building. For each type, we considered cost variations for two average unit sizes (150 sq. meters and 100 sq. meters) and two density levels as appropriate for each type (e.g., from 25 to 38 units per net residential acre for the row house, from 200 to 300 for the panel building). The major findings are:

1. Construction hard costs per sq. meter are actually highest for high-rise buildings because they require elevators and more substantial structural features. For the smaller housing unit, the cost per sq. meter is Kcs 3,000 for the low-rise apartment building, Kcs 3,092 for the row house, Kcs 3,642 for the single family house, and Kcs 5,058 for the panel building.

2. In addition to the cost of construction itself, estimated total development costs include amounts for land purchase, infrastructure, fees, reserve, and construction financing. The range in the estimated totals is as follows:

- With the assumption of fairly high land costs (Kcs 800/sq. meter), larger units, and lower densities: the single family house is the most expensive form (Kcs 1.48 million). A unit in the panel building is not much lower (Kcs 1.36 million). The low-rise apartment unit is least expensive (Kcs. 968,000).

- With the assumption of lower land costs (Kcs 200/sq. meter), smaller units, and higher densities: the panel building bears the highest cost (Kcs 1.00 million per unit), compared to Kcs 830,000 for the single family house, Kcs 712,000 for the row-house, and Kcs 633,000 for the low-rise apartment unit.

3. Families earning the 1991 median annual income in CSFR urban areas (Kcs 81,000) could not afford to buy any of these units. However, the number of higher income households that may be able to do so is far from insignificant. Even though CSFR incomes are more equally distributed than is typical in Western economies, there

is a considerable amount of variation; i.e., substantial numbers in very low income groups and significant numbers as well with very high incomes. In urban areas, households with incomes below Kcs. 60,000 make up 30 percent of the total, but those with incomes above Kcs. 100,000 make up 32 percent.

4. While a year ago private mortgage lending did not exist in the CSFR, there are signs it will emerge soon. We have assumed that in the near term, if a would-be borrower can make a 20 percent down payment, lenders will come forward to provide financing through a Price Level Adjusted Mortgage (PLAM)---an attractive instrument because even though it provides no subsidy and protects the lender in an inflationary environment, it permits the lender to charge a quite low rate of interest (we have assumed 4 percent). We have further assumed that households in the upper third of the income distribution can afford to pay at least 30 percent of their income to cover mortgage payments. Under these conditions, an annual income of Kcs 140,000 would be needed for a household to be able to afford to purchase the lowest cost row-house in our analysis (development cost of Kcs 712,000).

5. The income data base indicates that 9.6 percent of all households in the CSFR (509,000 in number) have incomes at or above that level. For a house costing Kcs 1.0 million (again assuming 30 percent of income is devoted to debt service) the PLAM implies a required annual income of Kcs 196,000--85,000 households in CSFR cities and towns (1.6 percent) have incomes at least that high. It is also worth noting that the information in our data base surely understates the incomes that are actually available today since it does not reflect the varied new forms of income generation that have emerged since then. Our purpose, however, was not to estimate market demand in any precise way--only to find out whether the number of households that could afford to buy privately produced housing, even at today's prices and padded estimating procedures, is significant enough to justify policies to facilitate the emergence of a private development sector. We believe the analysis clearly supports that conclusion.

6. Even though private housing development should be seen as an attractive investment opportunity today, it would be much more so if present high costs could be reduced. And it does appear that costs as we have estimated them remain much higher than they need to be (our per-unit prototype costs for the CSFR represent from seven to 18 times the median national income--in contrast, the median price of a new unit in the United States is only four times median income). If the cost of our row house prototype above could be reduced by 20 percent, doing so would expand the percentage of all households that could afford it from 9.6 to 22.3 (i.e., expand the potential market nationwide from 0.5 million households to 1.2 million).

7. The most promising opportunity for reducing costs in the short term may be to reduce padding (i.e., cut back the contractor mark-ups for overhead recovery and profit which have been estimated as at least 40 percent of direct costs). The chief means for accomplishing this would be the widespread adoption of competitive procurements

for all housing development (in both the public and private sectors), although legislative changes to eliminate some of the market segmentation (by locality and work-type) that has contributed to stifling competition in the past is also essential.

8. Other promising opportunities appear in new approaches that reduce materials and other non-labor inputs per unit: for example, (a) encourage high-density low-rise development in site planning (cuts land requirements and offers the likelihood for much higher rates of home purchase in urban areas); (b) encourage the application of available technologies to reduce the thickness, thus the cost, of exterior walls (unusually high by world standards); and (c) encourage the use of lighter interior partitioning and the development of more efficient interior floor plans.

9. Further research is warranted into the cost savings potential of the physical approaches noted above, but also into the structure of the industry as a whole. The structure and efficiency of materials production and distribution, and its ties to development firms, deserves particular attention.

Chapter

TODAY'S HOUSING COSTS

COST ESTIMATING METHODS

In the communist era, costs for the state housing construction program (Komplexna Bytova Vystavba, or KBV) were estimated by architects and engineers as a basis for establishing five year plans, receiving subsidies, and paying invoices to contractors. The types and characteristics of housing that could be developed were regulated by a series of rigid government standards (Technicko Hospodarske Ukazatele, or THU), determining, for example, the density, type of construction technology, materials, and size of units built under the five year plans. Cost estimators for construction firms had to follow detailed guidelines that were uniform across the country. Handbooks specified material and labor inputs for individual tasks at a high level of detail; for example, tables showed person-hour labor usage to be assumed for removing tree stumps that varied according to the diameter of the stump.

Until 1976, the state subsidy payment for construction was based on itemized cost accounting. The Ministry of Construction then changed to a system of average costs per cubic meter. Payments from the state to the Savoinvestas (regional investment organizations), and ultimately the state construction companies, were determined by the number of units produced in different categories as defined by factors such as useable space per unit, building type, and construction technology. Additional compensation was made for extras, such as balconies. It is widely believed that this approach artificially increased the amount of the subsidies paid for housing to the production entities; i.e.,

unnecessarily expensive techniques were assumed as the basis for setting the standards in order to generate a higher payment from the government.

Many of the artificial factors that increase costs have been carried over into today's cost estimation techniques which combine average costs per cubic meters for some items with more detailed specifications in the handbooks for others. The standards have recently been updated to reflect price increases. The Agency for Standards in Civil Engineering (Ustav Racionalizace ve Stavebnictve, or URS) has built the standard estimating method into a computer system (FITO), which can be used to facilitate the estimating process. The handbooks, including average cost standards, are used ubiquitously for cost estimating in the CSFR (by private and government developers alike) and apparently with great consistency.[1]

Since fully competitive markets for inputs do not exist, there is no basis for estimating what costs would be if they did exist. The CSFR's present standard estimating method is the only estimating approach now available and, therefore, we have had to apply it in this analysis. It should be emphasized, however, that *the estimates provided here are, therefore, surely higher than would result in a truly competitive environment.* Analysts have suggested that in general under the present system, contractors overhead recovery and profit often exceeds 40 percent of direct costs (see, for example, Irwig, 1992).

The government now regularly updates, and publishes, a price index to keep estimators appraised of increasing prices (important now, particularly after the major "price liberalization" in 1991). Data below (from the Slovak Ministry of Construction) show how rapidly handbook based costs (Kcs) have changed since 1986 for an average government produced 65 sq. meter apartment in an eight storey panel building.

Year	Cost/unit	Cost/sq.meter
1986	170,000	2,615
1989	200,000	3,077
1990	260,000	4,000
1991	380,000	5,846

In the first stage of the work for this report, experienced construction cost estimators used the handbook method to estimate the costs of 12 residential developments for which designs were available. These estimates covered a broad range of housing types. Zapletalova, et al, (1991) prepared estimates for three low-rise projects, four high-rise projects, and two renovation options. The URS provided estimates for an additional three low-rise developments. Estimates for the four high-rise projects and

[1]After the cost estimates for low-rise units presented in Annex A were prepared, we gave the specifications to another firm and asked them to generate estimates for the same buildings. Differences in the resulting estimates were negligible.

three low-rise projects (by URS) were selected as the basis for this analysis and are presented and interpreted in Annex A.

Using these costs as a base, the estimators then assisted in developing the estimates for four prototypes which are examined in the body of this report. Again, it is worth emphasizing that these estimates take into account the substantial increases in material prices implemented in 1991, but they assume traditional institutional arrangements and procedures and are based on the handbook and average cost estimating method. These costs are, therefore, higher almost by definition than would be expected in a fully competitive environment.

CONSTRUCTION HARD COSTS

The developments included in Annex A for which cost estimates were made had average housing units ranging in size from 120 to 240 sq. meters (the average unit size in the CSFR according to the 1991 Census is only 47 sq. meters). We first made adjustments to these figures, to develop estimates for two standardized types of housing units in four different types of structures (see discussion of approach in Annex A). As shown in Table 1.1 we have defined a "larger unit" with 150 sq. meters of floor space (which would be viewed as "luxurious" in comparison to today's typical standards), and a "smaller unit" with 100 sq. meters (a size that should still be attractive to families at the higher end of the income distribution now living in multi-unit structures). In both models, 20 sq. meters of garage space is provided for each unit. The model structure types are:

- *Detached Single Family House* (garage plus two stories, concrete block, brick exterior)
- *Single Family Row House* (garage plus two stories, concrete block, stucco finish)
- *Four Unit Apartment Building* (garage plus two stories, non-elevator, concrete block, stucco finish)
- *High Rise Apartment Building* (garage plus eight stories, elevators, panel construction)

As shown on the table, additional floor space is required in the two apartment buildings (but not in the single family types) for circulation and common areas. In all cases, a 48 unit new development was assumed (a scale we believe to be reasonable for private developments in urban areas in the next few years). Also, all buildings are adequately insulated (unlike most of the panel structures built in the CSFR over the past 40 years).

Table 1.1
CONSTRUCTION HARD COSTS

	Single Family		Apt. Bldg.	Panel High-Rise
	Detach.	Row		
SQ. METERS/HOUSING UNIT				
Larger Unit				
Living Space	150	150	150	150
Garage	20	20	20	20
Circ./Common Sp.	0	0	17	26
Total	170	170	187	196
Smaller Unit				
Living Space	100	100	100	100
Garage	20	20	20	20
Circ./Common Sp.	0	0	12	18
Total	120	120	132	138
CONSTRUCTION HARD COSTS				
Kcs/total sq. meter				
Larger Unit	3,235	2,735	2,690	4,593
Smaller Unit	3,642	3,092	3,000	5,058
Kcs 000/unit				
Larger Unit	550	465	503	898
Smaller Unit	437	371	396	698

The resulting average construction hard costs (Kcs), per sq. meter of total floor area and per unit, are shown in Table 1.1. The cost per sq. meter for the smaller (100 sq. meter) unit is higher than for the larger unit in each building form (since there are more lineal meters of wall, for example, per sq. meter of total floor area). But, as would be expected, the total costs of the small units are substantially below those for the larger units. Costs range from Kcs. 2,980 to 5,528 per sq. meter, and from Kcs. 393,000 to 982,000 per unit.

The most important finding--which may come as a surprise to many--is that the panel high-rise building is by far the most expensive building form (for either unit size, almost double the per unit cost of the comparable unit in the row house). Estimates were also prepared for the high-rise building using alternative construction systems (brick, steel frame with brick curtain walls, and poured concrete construction), but the cost per sq. meter in all cases was much above those shown here for low-rise structures. Among the high-rise options, none stands out as having important cost advantages over the others (see Annex A for further discussion of these options). Because it requires elevators and more substantial structural features, the high-rise form is, by definition, more expensive.

The variations between the low-rise forms are comparatively small. The per unit cost of the smaller unit in the walk-up apartment building is 11 percent higher than that in the single-family detached home, which is, in turn, 20 percent higher than that in the row house (the row house form is least expensive because of efficiencies gained by using party-walls between units). Analysis of the cost data in Annex A suggests that brick construction would raise prices over the porous concrete block model assumed here by about 20 percent.

SITE PREPARATION, INFRASTRUCTURE, AND LAND COSTS

Assumptions: Density and Land Requirements

Costs in these categories vary with the amount of land used per housing unit; i.e., inversely with residential density. To illustrate, we assume a range in the number of sq. meters of net residential land provided for each unit, as appropriate for the four building forms defined above and chosen to represent fairly low densities by traditional standards in Czechoslovakia (see top panel of Table 1.2). The range is from 100 sq. meters per unit for the high-rise building to 500 sq. meters per unit for the single-family detached home; this yields net residential densities ranging from 20 units per net hectare for the single family home to 100 units per net hectare for the high-rise development.

Table 1.2
SITE PREPARATION, INFRASTRUCTURE, AND LAND COSTS

	Single Family		Apt. Bldg.	Panel High-Rise
	Detach.	Row		
LOWER DENSITY				
Units/Net Hectare	20	25	50	100
Sq.Meters Land/Unit				
Residential	500	400	200	100
Roads	75	70	24	5
Total	575	470	224	105
Meters Road/Unit	7.50	7.00	2.40	0.50
HIGHER DENSITY				
Units/Net Hectare	30	38	75	150
Sq.Meters Land/Unit				
Residential	333	267	133	67
Roads, Other	57	53	19	4
Total	390	320	153	71
Meters Road/Unit	5.67	5.33	1.93	0.40
SITE PREP.,INFRASTRUCTURE COSTS (Kcs 000/unit)				
Lower Density				
Site Preparation	17	14	7	3
Infrastructure	107	100	34	7
Total	125	114	41	10
Higher Density				
Site Preparation	12	10	5	2
Infrastructure	81	76	28	6
Total	93	86	32	8
LAND COST/UNIT (Kcs 000)				
Higher Cost (Kcs 800/sq. meter)				
Lower Density	460	376	179	84
Higher Density	312	256	122	57
Lower Cost (Kcs 200/sq. meter)				
Lower Density	115	94	45	21
Higher Density	78	64	31	14

We then use design standards to calculate the additional land needed for roads.[2] Total land requirements (residential plus roads) range from 105 sq. meters to 575 sq. meters per housing unit.

In both the higher and lower density alternatives, the number of lineal meters of roads (and utility lines) is approximated by dividing the total road area by an average road width of 10 meters.

In the bottom panel of Table 1.2, we make similar calculations to develop a set of land requirements that represent higher density development. In each case, the amount of residential land provided per unit is one third lower than in the lower density case in the top panel. Total land requirements range from 30 to 439 sq. meters per unit; net densities range from 30 to 133 units per hectare.

If we take the row house as an example, a 400 sq. meter plot should be attractive to higher income households, given alternatives available today. Broadscale consumer acceptance of the smaller (267 sq. meter) among higher income groups is more questionable, but with efficient site planning (e.g., the cluster approach), single family developments at around this density can be quite attractive and have been frequently marketed with success in western countries. Homes in such developments are less expensive and thus affordable to families farther down the income distribution. For such families, the chance to get out of a panel building and purchase their own home with its own garden could be compelling. Using less land for residential development also offers important social benefits--lower infrastructure costs, less negative impact on the environment, and less encroachment of urban growth into agricultural lands.

Costs of Site Preparation and Infrastructure

For these elements, apartment buildings have the cost advantage over single family homes. To accommodate the same number of families on a given site, single family developments necessitate clearing and grading more of the land, and require more lineal meters of pipe (for water supply and sanitation) and access roads.

Site preparation costs were calculated at Kcs. 30 per sq. meter of total land required. Infrastructure costs were calculated at a total of Kcs. 14,300 per lineal meter of roads based on the following average conditions (Kcs. per lineal meter) as estimated by The Building Institute in Bratislava:

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[2]Typically, the road area needed for adequate circulation represents a higher percentage of net residential land where there are more buildings per hectare. The top panel of Table 1.2, for example, shows that the road area represents 15 percent of the residential area for a neighborhood made up of 500 sq. meter single family lots (20 buildings per ha.), but only 5 percent for the high-rise development (4.2 buildings per ha.). Relationships used here were calibrated from data in Kingsley, 1990.

Water	1,650
Sewer	1,700
Gas	1,650
Electricity	1,300
Telephone	1,500
Road constr.	6,500
Total	14,300

As expected, the resulting costs (Table 1.2) are substantially higher for the lower density building forms; i.e., the opposite of the pattern found for construction hard costs. They range from only Kcs 8,000 per housing unit for the high-rise building at the higher density level, up to Kcs 125,000 per unit for single family detached housing at the lower density level.

Cost of Land

In market economies, land prices are determined by the competitive bidding of potential buyers. Prices vary dramatically, depending mostly on location--the cost of land in the central business district of a large city may well be more than 100 times than that on the urban fringe which, in turn, is significantly higher than the land cost in the country-side.

In the CSFR, land prices were tightly controlled in the communist era and did not vary with location. Until very recently, there was a uniform official selling price of Kcs 250 per sq. meter for all government owned land in the nation. On September 5, 1991, however, a Czech Republic Ministry of Finance decree[3] established a system in which prices are still controlled but there is locational variation. The prices, per sq. meter of raw land in urban areas, are as follows (lower prices are specified for rural and forest lands):

- 1,700 Kcs - city of Prague
- 800 Kcs - statutory cities (Frantičkovy, Jesenic, Karaviná, and Mariánské Lázně).
- 500 Kcs - Český Krumlov, Jáchymov, Jesenik, Karaviná, Luhačovice, Poděbrady, and Templice.
- 150 Kcs - towns with more than 15,000 inhabitants.
- 100 Kcs - towns with more than 5,000 inhabitants.
- 70 Kcs - towns with more than 2,000 inhabitants.
- 20 Kcs - other towns.

Even these prices are remarkably simplistic in relation to market outcomes. In Prague, there have been enough private sales over the past year to make some rough

[3]Pursuant to Section 2, Paragraph 2, Item b of the act of the Czech National Council, No. 265/1991.

estimates of market values. One expert who has studied data on these transactions[4] indicates that today's market land prices around Wenceslas Square would be around Kcs 9,000 per sq. meter, whereas there are a number of areas within the city's boundaries where the market price would be below Kcs 200 per sq. meter. Yet, for the time-being at least, all sales of government property must take place at Kcs 1,700 per sq. meter regardless of location. It seems likely that, as the market continues to develop, there will be substantial pressure to change this decree to permit a more liberal approach.

The bottom panel of Table 1.2 illustrates the effects of two alternative land prices (Kcs 800 per sq. meter and Kcs 200 per sq. meter) on the models we have defined. Again, lower densities imply higher land costs on a per housing unit basis. At Kcs 800 per sq. meter, land costs range from Kcs 57,000 per unit (high-rise building and higher density) to Kcs. 460,000 per unit (single-family house at the lower density). At Kcs 200 per sq. meter, the range for the same types and densities goes down to Kcs 14,000 to Kcs 115,000 per unit.

TOTAL COSTS AND COST DYNAMICS

Additional Costs

Table 1.3 looks at total costs for our models, putting the components defined so far together with three additional cost items: fees, reserve, and general conditions (site trailer, fencing etc.). These are calculated in total as 20.5 percent of the sum of construction, site preparation, and infrastructure. The fees add to 9.5 percent. Several of them are consistent with typical CSFR practice (as reported by the Building Institute, Slovakia): architectural fees, 4 percent; project management, 2 percent; and developer fee, 2 percent. We have counted in two additional fees: legal fees, 0.5 percent; and marketing costs, 1 percent. The reserve is calculated as 8 percent, and general conditions at 3 percent.

The second item that has been added to the standard list is the cost of construction financing (an obvious requirement in private development, although this cost was not explicitly considered in traditional construction cost accounting in the CSFR). Financing costs are calculated as the total interest payment entailed in borrowing the sum of construction, site preparation, infrastructure, and land costs, at 14 percent (a typical short-term commercial rate in the CSFR in late 1991). We have assumed that these funds are applied over a two year development period in total, but loans will be staged in increments so that the average loan period is 1.2 years.

[4]Interview with Anthony Caine, February 1992.

Table 1.3
COMPARISONS OF TOTAL COSTS PER UNIT (Kcs 000)

	Single Family		Apt. Bldg.	Panel High-Rise
	Detach.	Row		
HIGHER COST LAND				
Larger Unit-Lower Density				
Constr.Hard Costs	550	465	503	898
Site Prep.,Infra.	125	114	41	10
Land Cost	460	376	179	84
Fees, Reserve, GC	138	119	112	186
Financing	205	173	133	186
Total	1,478	1,247	968	1,364
Smaller Unit-Higher Density				
Constr.Hard Costs	437	371	396	698
Site Prep.,Infra.	93	86	32	8
Land Cost	312	256	122	57
Fees, Reserve, GC	109	94	88	145
Financing	153	129	101	143
Total	1,103	936	740	1,050
LOWER COST LAND				
Larger Unit-Lower Density				
Constr.Hard Costs	550	465	503	898
Site Prep.,Infra.	125	114	41	10
Land Cost	115	94	45	21
Fees, Reserve, GC	138	119	112	186
Financing	147	125	110	175
Total	1,075	917	811	1,291
Smaller Unit-Higher Density				
Constr.Hard Costs	437	371	396	698
Site Prep.,Infra.	93	86	32	8
Land Cost	78	64	31	14
Fees, Reserve, GC	109	94	88	145
Financing	113	97	86	136
Total	830	712	633	1,000

It is also important here to note two items that have *not* been included. One is allocations for "regional influences" and "technical allowances". These are cost items in the present standard CSFR estimating method that normally account for around 16 percent of total development costs (see Annex A), but virtually always amount to no more than padding. The other omission from the items explicitly listed on the table is not really omitted at all: profit. Even after the deletion of the two identifiable allowances noted immediately above, all the cost specialists contributing to this study agreed that enough padding remains in other categories to provide what would, in Western terms, be considered an excessive profit for the development entity. (See further discussion of these issues in Annex A).

Total Cost Per Housing Unit

Table 1.3 shows the total 1991 development costs per housing units for a range of circumstances drawn from the models defined earlier.

At the more expensive (Kcs 800 per sq. meter) land price, the single-family detached unit is the most expensive although not by a large amount. For the larger unit-lower density model, the full cost of the single-family unit is Kcs 1.48 million, eight percent above the total for a unit in the high-rise panel building, and 19 percent above that for a row-house unit. The unit in the walk-up apartment is the cheapest at Kcs 968,000.

For all building types in this group, construction financing accounts for 14 percent of total development cost, and fees account for another 9 to 14 percent. There are strong contrasts between building types, however, in the percentage contributions of the other cost components. For the single family home, land, site preparation, and infrastructure make up 39 percent of total cost and construction itself accounts for only 37 percent (these shares are similar for the row house). For the high-rise building, however, construction accounts for 66 percent and land, site preparation, and infrastructure costs contribute only 7 percent.

The relative prices for units in each of the same building types are substantially lower when the smaller unit-higher density options are chosen (by about 25 percent for all types), although the relative cost position between the comparative building forms does not change (i.e., the single family house is still the most expensive--at Kcs 1.10 million--and the walk-up apartment unit is the least expensive--at Kcs 740,000). In other words, given the assumptions we have chosen, a 33 percent reduction in the amount of land provided for each unit coupled with a 33 percent reduction in its floor area, has led to a 25 percent reduction in total development costs.

The picture changes in many ways at the lower (200 per sq. meter) land cost. Regardless of unit-size and density, it is the high-rise building that is most costly. In the smaller unit-higher density option, for example, the total cost of a unit in the high-rise

building is Kcs 1.00 million. This is 17 percent higher than the cost for the single family house, 29 percent higher than the row-house unit, and 37 percent above the cost of the low-rise apartment unit (which comes in the lowest of all examples on this table at Kcs 633,000).

Here, as would be expected with lower land costs, construction hard costs make up a larger share of the total. Construction costs shares range from 52 percent (for the row-house) up to 70 percent (for the high-rise building). Land, site preparation, and infrastructure costs range from two percent (for the high-rise) to 20 percent (for the row-house).

Chapter 2

HOUSEHOLD INCOMES AND HOUSING AFFORDABILITY

How many households in Czechoslovakia could afford to purchase housing units at the costs estimated in Chapter 1? This Chapter responds to that question. It first looks at information on 1991 household incomes from a new data source, noting difference in income by income-source (e.g., wages vs. pensions) and location (urban vs. rural, in both Republics). It then describes the way those incomes are distributed. The next step is to describe the rules for different mortgage instruments that might be developed in the CSFR. Finally, data on income distributions are used as a basis for estimating the number of households that could afford new housing at various cost levels assuming each of the mortgage instruments that have been specified.

THE HAIS DATA BASE

The income data described in this chapter were derived from the Housing Allowances and Income Support (HAIS) data base, developed for another housing study for the CSFR (Telgarsky, et al, 1992). This was created by combining information from the *Mikrocensus* of 1988 (data on social, income, and housing characteristics for a random nation-wide sample of 101,000 households) and the 1989 *Family Budget Survey* (data on incomes and expenditures for a sample of 5,500 households). A matching of characteristics on both files permitted the attribution of key income-expenditure relationships from the *Family Budget Survey* data to each of the records in the *Mikrocensus*. The next step was to use exogenous data on recent income trends to update household incomes to 1991 levels.

SOURCES OF INCOME

Table 2.1 shows the distribution of households, grouped according to the primary income source of the head of the household. Eight groups are identified: (1) cooperative agriculture; (2) private agriculture; (3) wages--blue collar; (4) wages--white collar; (5) entrepreneurial activity; (6) pensions--household head not economically active (that is, 60 years of age or older); (7) pensions--household head economically active (under 60); and (8) other.

Types of Households

The two wage earner categories are the largest, together accounting for two thirds percent of all households. The next largest group is non-economically active pensioners (23 percent), followed by those whose primary income source is cooperative agriculture (7 percent). Pensioners in the economically active age group make up 4 percent of the total.[5] Entrepreneurs account for only 0.2 percent.

The Slovak Republic has a slightly larger share in the agricultural categories (8 percent vs. 6 percent in the Czech Republic) and pensioners account for a modestly larger percentage in the Czech Republic. Overall, however, the distributions in the two Republics are similar.

As would be expected, the contrasts are more pronounced comparing urban and rural areas. Compared to the cities, rural areas have higher percentages in the agriculture groups (14 percent vs. 3 percent) and the pension groups (32 percent vs. 24 percent) and a much smaller share are white-collar wage earners (18 percent vs. 38 percent). These data clearly re-emphasize, however, how small a role agriculture plays today in the CSFR workforce overall--14 percent is not a very large number and even in rural areas blue- and white-collar wage earners account for a much larger proportion (53 percent).

Income Levels

The estimated median annual income of all CSFR households in 1991 was Kcs. 83,000 (Table 2.2), substantially higher than the defined poverty line; e.g., Kcs. 50,400 for a family of four (with two children under 10 years of age). The median in the Slovak Republic (Kcs. 86,000) was six percent above that in the Czech Republic. In marked contrast to experience typical in western economies, the rural median (Kcs. 86,000) was well above that for urban areas (Kcs. 81,000).

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[5]This would be a surprisingly large percentage in western market-oriented economies. It is explained in that the CSFR permits "double dipping"; i.e., does not severely penalize receiving income from work and a pension at the same time.

Table 2.1
NO. OF HOUSEHOLDS BY PRIMARY INCOME SOURCE

		Primary Income Source of Head of Household							
		Agriculture		Wage Earner					
	Total	Coop.	Priv.	Bl.Col.	Wh.Col.	Entre-pren.	Non-EA Pension	Ec Act Pension	Other
NUMBER OF DECLARED HOUSEHOLDS (000)									
Czech Republic									
Urban	2674	55	0.2	919	980	6.1	603	99	11
Rural	1130	161	0.3	396	215	1.0	301	54	2
Total	3804	216	0.5	1316	1195	7.1	904	153	14
Slovak Republic									
Urban	1011	39	0.3	341	412	1.6	177	38	4
Rural	688	101	0.4	245	105	0.5	185	49	1
Total	1699	140	0.6	586	518	2.1	361	87	5
Total CSFR									
Urban	3685	93	0.5	1260	1393	7.8	779	136	15
Rural	1818	262	0.7	641	320	1.5	486	103	4
Total	5503	355	1.2	1901	1713	9.2	1265	239	19
PERCENT OF DECLARED HOUSEHOLDS									
Czech Republic									
Urban	100.0	2.0	0.0	33.7	40.8	0.2	17.5	3.7	0.3
Rural	100.0	14.2	0.0	35.1	19.0	0.1	26.6	4.7	0.2
Total	100.0	5.7	0.0	34.6	31.4	0.2	23.8	4.0	0.4
Slovak Republic									
Urban	100.0	3.8	0.0	33.7	40.8	0.2	17.5	3.7	0.3
Rural	100.0	14.7	0.1	35.6	15.3	0.1	26.9	7.2	0.2
Total	100.0	8.2	0.0	34.5	30.5	0.1	21.3	5.1	0.3
Total CSFR									
Urban	100.0	2.5	0.0	34.2	37.8	0.2	21.1	3.7	0.4
Rural	100.0	14.4	0.0	35.3	17.6	0.1	26.7	5.7	0.2
Total	100.0	6.5	0.0	34.6	31.1	0.2	23.0	4.4	0.3

Although there were few of them, entrepreneurs had the highest incomes (median of Kcs. 131,000, 58 percent above that for all households). Workers in private agriculture ranked second (Kcs. 112,000) with those in cooperative agriculture close behind (Kcs, 107,000). The median for white-collar wage earners (Kcs. 94,000) was only slightly above that for the blue-collar group (Kcs. 92,000). Older pensioners had the lowest median (Kcs. 33,000). It is of interest that the median for economically active pensioners (Kcs. 91,000), while much above that for those who had retired, was not higher than the incomes received by full time wage earners.

Composition of Household Income

The bottom panel of Table 2.2 shows other sources of income received by each household type (on average) in addition to the primary source. Clearly, it would be a mistake to characterize a household's financial position by the income it receives from its primary source alone. All groups receive noticeable sums from all sources.

Take, for example, urban households headed by white-collar workers. That employment yields only 75 percent of their total income. Because some family members in some of these households are pensioners, they receive income from that source (6 percent) and they receive, again on average, an even larger share from other public assistance payments (14 percent). Households headed by those who work for agricultural cooperatives in the countryside receive only 53 percent of their income from that source. The household heads, and/or other family members, also receive wages from other jobs (14 percent) as well as sizeable amounts from pensions and other public assistance (23 percent). The last category shown, "other", includes interest and other income from investment. While the percentage received from such sources is not dominant for any group, all groups do receive some income in this way and the amounts involved are far from trivial.

THE DISTRIBUTION OF INCOME

The conventional wisdom in the CSFR is that while incomes are low here by world standards, they are more equally distributed. This is a fair characterization when the nation is compared to western market-oriented economies, but it does not mean that all households are tightly concentrated around the average. There is a surprising amount of variation in the CSFR income distribution; i.e., substantial numbers in very low income groups and significant numbers as well with very high incomes.

Figure 2.1 shows the percentage distribution of households by income level for urban and rural areas. The shapes of the curves are similar, although the curve for rural areas is shifted somewhat more to the right, consistent with the higher rural median noted earlier.

Table 2.2
INCOME CHARACTERISTICS OF HOUSEHOLDS BY PRIMARY INCOME SOURCE

		Primary Income Source of Head of Household							
		Agriculture		Wage Earner					
	Total	Coop.	Priv.	Bl.Col.	Wh.Col.	Entre-pren.	Non-EA Pension	Ec Act Pension	Other
MEDIAN HOUSEHOLD INCOME (1991 Kcs 000)									
Czech Republic									
Urban	80	101	136	89	92	139	33	86	44
Rural	85	108	77	95	98	157	34	93	44
Total	81	106	109	91	93	142	33	89	44
Slovak Republic									
Urban	84	101	96	89	94	108	34	87	38
Rural	89	114	120	102	104	95	34	100	50
Total	86	110	112	93	95	108	34	95	43
Total CSFR									
Urban	81	101	112	89	93	129	33	87	43
Rural	86	110	109	97	100	136	34	97	48
Total	83	107	112	92	94	131	33	91	43
PERCENT OF INCOME BY SOURCE									
Urban									
Agric. income	2.4	51.8	57.3	0.8	0.6	0.6	0.5	1.7	2.2
Other wages	62.3	19.2	18.6	71.4	74.8	12.2	1.6	41.2	12.3
Pensions	15.8	5.8	3.8	6.5	6.1	3.0	83.6	42.3	4.5
Other Pub. Assist.	14.7	16.3	13.3	17.0	14.2	7.4	9.7	10.0	29.6
Other	4.8	6.8	7.0	4.2	4.2	76.9	4.7	4.8	51.3
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Rural									
Agric. income	13.7	52.5	76.8	4.6	4.1	1.5	2.4	11.1	5.9
Other wages	44.7	13.5	14.5	63.6	66.8	14.4	0.9	32.5	11.7
Pensions	18.8	8.1	8.2	8.4	8.2	4.7	77.4	37.0	8.3
Other Pub. Assist.	14.1	14.8	12.2	15.8	14.0	5.6	9.8	10.1	34.1
Other	8.6	11.1	18.2	7.6	6.9	73.8	9.5	9.3	39.9
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

The urban distribution shows a sizeable group with very low incomes (almost 10 percent of all households in the Kcs. 20,000-30,000 range). Percentages drop off somewhat in the Kcs. 40,000-70,000 range then peak again in the Kcs. 80,000-100,000 range. The distribution then gradually declines as incomes increase. Those with incomes above Kcs. 100,000 make up 32 percent (almost one third) of the total, while those with incomes below Kcs. 60,000 make up 30 percent.

ALTERNATIVE MORTGAGE INSTRUMENTS

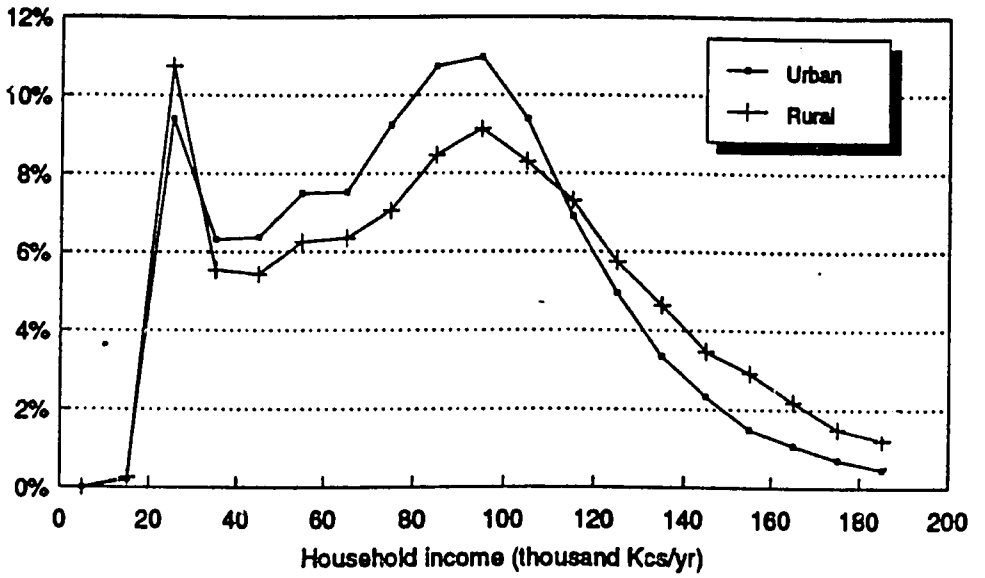
For decades in the CSFR, the government has offered substantial subsidies for the construction of new housing. A family that wanted to build a single family house could borrow up to Kcs 250,000 from the state savings bank at an interest rate of 2.7 percent (1.0 percent for young families) to be repaid over a period of 40 years (the land and public infrastructure were provided free of charge). For cooperatives, the terms were even better. A government grant covered up to 60 percent of the construction cost. The household had to put in a "membership fee" equal at least to 26 percent of the grant, but the investment bank provided a 30 to 40-year loan for the remainder. The interest rate was 1.0 percent up to a specified ceiling, and 2.7 percent for any excess over that ceiling. Again, the land and infrastructure were free. The federal government has decided that these programs will be terminated completely by the end of this year. There are no plans to replace them with other public lending programs and private mortgage lending does not as yet exist in the CSFR.

The development of new private mortgage instruments is, therefore, a high priority, and given strong demand, it is likely that some form of private loans for housing will emerge soon. Considerable analysis has been done of late of the advantages and disadvantages of alternative mortgage instruments in Eastern European countries (see Telgarsky and Mark, 1991, and Ravicz, 1992). Here, we review the characteristics of only three of them to illustrate the contrasts.

Fixed Rate Mortgage (FRM). The loans previously offered by government banks in the CSFR were FRMs. With this type of mortgage, the interest rate is fixed when the mortgage is originated and calculations are made to determine a stream of equal monthly payments that will pay off both the principle and the interest over the specified term of the loan. This instrument greatly benefits the borrower--since wages are likely to increase over time and the payment is fixed, the amount the borrower's monthly mortgage payments become a smaller and smaller fraction of his income over time.

This type of mortgage, however, is much riskier for the lender. In setting the interest rate at the outset, he has to anticipate future changes in the economy. This feature of FRMs was the major reason for the failure of so many savings and loan institutions in the U.S. over the past decade. The economic environment was such that they had to substantially increase the interest rates they paid to depositors to attract

Figure 2.1
CSFR Income Distribution



capital, but their portfolios were dominated by FRMs from the past that carried much lower rates.

Adjustable Rate Mortgage (ARM). The ARM was designed to correct the problem just described. The interest rate on this type of mortgage is periodically adjusted by an index that reflects changing interest rates in the financial sector as a whole. The lender is thus protected. But the problem here is that substantial risk is shifted back to the borrower. Major increases in interest rates can push the required monthly payment up to a level much higher than the family can afford.

Price Level Adjusted Mortgage (PLAM). The PLAM is a compromise that reduces the risk for the lender without being so threatening to the borrower. An interest rate is fixed at the start. But at the end of each year, the remaining principal that is due is adjusted for inflation. Thus the amount of the family's payment in the next year can be higher--they are still charged the same interest rate, but it is applied to a larger balance. Under PLAMs, the percentage of the borrowers income that must be paid each month can

indeed increase for a time, but studies completed for Bulgaria and Hungary (Ravicz, 1992, and Struyk, et al, 1992) suggest that even under more inflationary environments than currently being experienced in the CSFR, this approach is not likely to strain family budgets to an unreasonable extent as can occur under an ARM. Because the lender is protected from inflation in this way, he can charge a rate of interest under a PLAM considerably below what he would have to charge for an FRM.

So far, there are no private financial institutions offering mortgages of any of these types in the CSFR. However, considering experience in other countries and assuming the continuation of the reform process, it seems likely that such opportunities could develop reasonably soon.

AFFORDABILITY OF HOUSING PROTOTYPES

Table 2.3 shows the annual incomes required to be able to afford housing units with development costs in the range of those estimated in Chapter 1 under both an FRM and a PLAM. In all cases we assume a 20 percent down payment. This means that a family that wants to purchase a unit with a total cost of Kcs 700,000 would have to pay Kcs 140,000 in cash up front--a Kcs 300,000 downpayment would be required for a Kcs 1.5 million unit.

Another important determinant is the fraction of their total incomes that families can actually afford to spend on mortgage payments. Given substantial increases in the prices of non-housing goods and services over the past year, the figure is certainly more limited than it might have been, particularly for lower income groups. Nonetheless, experience in other countries has shown that when families have the opportunity to buy their own home (particularly a single family home or row house on its own independent

Table 2.3
HOUSING AFFORDABILITY

	Development cost/unit (Kcs 000)				
	700	800	1,000	1,200	1,500
AMOUNT OF LOAN					
Down payment (%)	20	20	20	20	20
Down payment (Kcs 000)	140	160	200	240	300
Amt. Loan (Kcs 000)	560	640	800	960	1200
FIXED RATE MORTGAGE (12%, 20 years)					
Monthly payment (Kcs)	6,248	7,140	8,925	10,710	13,388
Annual Income Required (Kcs 000)					
20% paid for loan	375	428	536	643	803
30% paid for loan	250	286	357	428	536
PRICE LEVEL ADJ. MORTGAGE (4%, 20 years)					
Monthly payment (Kcs)	3,434	3,924	4,905	5,887	7,358
Annual Income Required (Kcs 000)					
20% paid for loan	206	235	294	353	441
30% paid for loan	137	157	196	235	294

plot of land) they will make sacrifices to do so. In addition to the added enjoyment and independence of living in such a unit, they appear to give great weight to the likelihood of appreciation in property values; i.e., they are not just paying for a place to live, but are investing in an asset that should add substantially to their financial position over the long term.[6]

For those in the upper third of the income distribution, we judge that families will be willing and able to pay at least 30 percent of their incomes to service home mortgages. To illustrate the contrasts, however, we also test out the implications of a 20 percent ratio in Table 2.2.

To finance the loan amount through an FRM, we assume a 12 percent interest rate (not unreasonable considering that short term commercial rates were at 14 percent in early 1992), and a 20 year term. The table shows that under the assumption of a 20 percent mortgage payment rate only families earning Kcs. 375,000 per year could afford a unit even at the low end of the range (Kcs 700,000 total development cost). If the ratio is moved up to the assumption that 30 percent of income will be devoted to servicing the debt, the required income drops to Kcs 250,000 for a housing unit at that level.

The use of a PLAM instead makes a great deal of difference (we assume a four percent real interest rate). At 20 percent, the required annual income drops to Kcs 206,000, and at 30 percent, to Kcs 137,000. At 30 percent, the income required to afford the lowest cost row house prototype in our estimates (Kcs 712,000 total development cost) is Kcs 140,000. The income data base indicates that 9.6 percent of all households in the CSFR (509,000 in number) have incomes at or above that level.

A number of the prototype options in the analysis had total development costs in the range between Kcs 700,000 and Kcs 1.0 million. For a house costing Kcs 1.0 million (again assuming 30 percent of income is devoted to debt service) the PLAM implies a required annual income of Kcs 196,000--85,000 households in CSFR cities and towns (1.6 percent) have incomes at least that high.

It is also worth noting that the information in our data base surely understates the incomes that are actually available today since is was created by extrapolating from the 1989 *Mikrocensus* and had no way of capturing the varied new forms of income generation that have emerged since then. Our purpose, however, was not to estimate market demand in any precise way (considerable additional market analysis will be required for that)--only to find out whether the number of households that could afford to buy privately produced housing at today's prices is significant enough to justify policies to facilitate the emergence of a private development sector. We believe the analysis clearly supports that conclusion.

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[6]In the United States, 70 percent of average family wealth is accounted for by the value of owner-occupied homes (Levy and Michel, 1991)

Chapter 3

OPPORTUNITIES TO IMPROVE EFFICIENCY

Total development costs for the prototype housing units analyzed in Chapter 1 range from 7.4 to 18.3 times the median urban income in the CSFR (Kcs 81,000). Multiples in this range are much higher than those typical in market-oriented economies. For example, the comparable multiple in the United States in 1989 (median value of new housing/median household income) was only 4.0.[7] This Chapter reviews some hypotheses about why new housing in the CSFR is so expensive and some ideas about steps that could be taken to bring its costs down to more affordable levels. It also offers suggestions as to future research needed to support this goal.

INFLUENCING HOUSING COSTS

The Need for Competitive Procurement. From our review in Chapter 1 and Annex A, the most obvious starting point for cost reduction is to reduce the padding that is built into the current method of allocating work and reinforced by the presently institutionalized method for estimating costs. As noted, we have attempted to remove some of the most obvious forms in our estimates but it seems clear that a substantial amount remains; i.e., we did not include two categories of allowances that amount to about 16 percent of total costs whereas the conventional wisdom is that total padding may amount to around 40 percent.

[7]The 1989 *American Housing Survey* reports a median value of new construction units of $110,846 and a national median household income of $27,735.

Irwig (1992) identifies several component elements in these mark-ups: (1) discounts on listed material prices from state material suppliers; (2) fees for the transportation of materials on- and off-site, based on the weight of materials incorporated into the building; (3) avoidance of social security taxes (on smaller "labor-only" subcontracts); (5) various other formalized contingencies.

The primary solution to this problem, of course, will be the widespread adoption of competitive procurement for housing development, both by private investors and the public sector. High priority should be given to making this a requirement for all government funded projects and encouraging its use in the private sector, along with the provision of technical assistance that will be required; e.g., the development of model Requests for Proposal (RFPs) and training in using the RFPs in operating an efficient procurement process.

Expectations About Labor Costs. Estimates by the URS indicate that materials costs dominate direct outlays for construction in the CSFR, accounting for as much as 70 percent of the total. Construction labor costs include wages plus related taxes (payroll taxes alone now account for 50 percent of wages), but labor costs in total now account for only about 10 percent of the total (a very different picture than is typical in the West where labor costs are normally the most important variable in construction efficiency).

As to the future, we can expect that payroll taxes will decline but, given the reform environment, that wages will surely increase. There are no doubt opportunities to improve the efficiency of labor utilization, but considering labor's currently small contribution to total costs, it does not seem to be an item that can be looked to for major cost reductions in the short term.

Other Opportunities. To the extent that other opportunities exist at present, the emphasis needs to be on approaches that will reduce materials and other non-labor inputs per housing unit produced. One of the most important that emerges from our analysis is the encouragement of *high-density, low-rise* development. For all but extremely expensive urban land, compact row-house type development is less costly than high-rise apartments. With the cluster approach and other innovative site planning approaches it can offer quite attractive home-sites. Most importantly, it offers the chance for individual households to buy houses on individual plots of land--an important stimulant for increasing urban homeownership. That opportunity can be important in its effect on the national savings rate as well as providing a more efficient way to house a growing urban population.

Two other opportunities are suggested by Irwig (1992). First, he points out that exterior walls in the CSFR account for about 30 percent of construction costs (vs. less than 20 percent in the U.S.). Western approaches, with integrated insulation, offer considerable savings here. Second, the use lighter interior partitions (e.g., plasterboard and steel studs, with insulation) would offer additional savings. It would also facilitate

more efficient interior layouts. The configuration of apartments in the CSFR has been strongly influenced by the panel systems used in the past--their standard dimensions have established rigidities that worked against variety and efficiency in design.

FURTHER RESEARCH

If the cost of our row-house prototype above could be reduced by 20 percent (relative to income), doing so would expand the percentage of all households that could afford it from 9.6 to 22.3 (i.e., expand the potential market nation-wide from 0.5 million households to 1.2 million). Clearly, improving the efficiency of the housing development sector should be a high priority for the CSFR, and the task will require continuing research along with legislation and other types of policy change.

The analysis in this report suggests some priorities for additional research. One set includes research (and demonstration as appropriate) to examine more precisely the savings potential of improved development approaches such as those discussed above: e.g., the problems of exterior walls, interior partitioning, and interior room layouts.

A second set of broader studies would appear warranted on the structure of the industry as a whole. Because they account for such a large share of costs, the materials production sectors should be given high priority in this research. Analysis would consider the ranges in types and sizes of firms and, more particularly, the forms of relationships that exist between the suppliers and the distributors and builders.

Finally, the practice of market research needs to be furthered throughout the development sector. This report has had to rely on crude assumptions. Little is known at present about what features potential home-buyers care most about in a new house and what they would be willing to pay for them, or how they would respond to different financing instruments. Focus groups and other inexpensive research techniques could shed much light on these issues and give developers confidence in responding to the market more efficiently.

Annex A

BASE COST ESTIMATES

This Annex presents the cost estimates for pre-existing designs which formed the basis for the prototype estimates in the main body of this report.

HIGH-RISE STRUCTURES

Costs for four high-rise structures (from Zapletalova, et al, 1991) are given in Table A.1: a traditional concrete panel building; a brick structure; a steel frame structure with brick curtain walls; and a poured concrete structure. The costs are presented in the 11 categories traditionally used in the CSFR in accord with the handbook method discussed in Chapter 1. The composition of each of these "Sections" is described below. While these estimates provided inputs to Chapter 1 costs, adaptations had to be made to more accurately reflect circumstances likely to be faced by private builders in the future and these are also noted.

Section 1: Architecture and Engineering

Architecture and engineering services are regularly estimated at 4 percent of construction costs (Section 3)--this same percentage was assumed for our cost prototypes in Chapter 1. The services provided by the architecture and engineering firm (projektant) include an urbanistic plan (which takes into account technical constraints such as ground conditions), a master plan, an assessment of infrastructure availability, an architectural plan (1:500 scale), a cost estimate, construction documents for approvals, construction documents for realization, and construction inspections. The breakdown of costs are typically 40 percent for wages, 20 percent for payroll tax (50 percent of wages), 20 percent for management and overhead, and 20 percent for profit.

Table A.1
COST ESTIMATES FOR HIGH RISE PROJECTS

	Characteristics and Costs				Percent of Costs			
	Panel	Brick	Stl.Fr. & Brick	Poured Concr.	Panel	Brick	Stl.Fr. & Brick	Poured Concr.
CHARACTERISTICS								
No. housing units	80	64	72	104	-	-	-	-
Bldg.footprint (sq.m)	837	980	1,035	1,300	-	-	-	-
Tot.floor area (sq.m)	7,796	10,334	10,918	10,600	-	-	-	-
Per unit (sq.m)	97	161	152	102	-	-	-	-
Unit area (sq.m)/unit	85	140	132	89	-	-	-	-
COST PER SQUARE METER (Kcs)								
1. Arch./engineering	210.6	179.2	153.9	140.0	3.0	3.0	3.0	3.0
2. Special installations	64.1	48.4	45.8	47.2	0.9	0.8	0.9	1.0
3. Construction								
Building	5,017.3	4,294.3	3,669.6	3,321.2	70.7	70.8	70.3	70.2
Water hookup	6.8	5.1	4.9	5.0	0.1	0.1	0.1	0.1
Sewer hookup	11.5	8.7	8.2	8.5	0.2	0.1	0.2	0.2
Gas hookup	3.5	2.6	2.5	2.5	0.0	0.0	0.0	0.1
Heating hookup	16.7	12.6	11.9	12.3	0.2	0.2	0.2	0.3
Electrical hookup	8.5	6.4	6.0	6.2	0.1	0.1	0.1	0.1
Low voltage hookup	2.3	1.7	1.6	1.7	0.0	0.0	0.0	0.0
Communal lighting	2.7	2.0	1.9	2.0	0.0	0.0	0.0	0.0
Subtotal	5,069.3	4,333.4	3,706.6	3,359.4	71.5	71.5	71.0	71.0
Paved areas	24.8	18.7	17.7	18.2	0.3	0.3	0.3	0.4
Roads	92.4	69.7	65.9	67.9	1.3	1.1	1.3	1.4
Landscaping	78.1	58.9	55.8	57.5	1.1	1.0	1.1	1.2
Subtotal	195.3	147.3	139.4	143.6	2.8	2.4	2.7	3.0
Total	5,264.6	4,480.7	3,846.0	3,503.0	74.2	73.9	73.7	74.1
4. Equipment/furnishing	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5. Artistic work	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6. Gen.condit./allowance								
General conditions	159.1	134.8	116.1	106.3	2.2	2.2	2.2	2.2
Regional influences	728.7	621.6	533.6	484.0	10.3	10.2	10.2	10.2
Technical allowances	241.0	205.8	176.2	160.0	3.4	3.4	3.4	3.4
Subtotal	1,128.8	962.2	825.9	750.3	15.9	15.9	15.8	15.9
7. Other costs	4.5	3.4	3.2	3.3	0.1	0.1	0.1	0.1
8. Reserve	421.1	358.4	307.7	280.3	5.9	5.9	5.9	5.9
9. Other invest. (land)	26.9	16.1	22.9	23.6	0.4	0.3	0.4	0.5
10. Cost paid by others	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11. Fee and inspection	169.4	163.4	150.9	125.6	2.4	2.7	2.9	2.7
Total	7,094.7	6,064.5	5,216.9	4,729.7	100.0	100.0	100.0	100.0

Section 2: Special Installations

This Section includes special installations of mechanical equipment and can be a dominant category in highly technical buildings such as hospitals. It includes the installation of boilers, heat exchange stations for central heating, electric transformers, meeting equipment, ventilation systems, etc. Only the costs of a heat exchange station was assumed for the residential developments costed in Table A.1. This cost was not included for our prototypes since smaller developments were assumed.

Section 3: Construction

This is, of course, the most important category, accounting for almost three quarters of all costs for each of the four housing types shown in Table A.1. We have divided these costs into two groups. The first includes true construction hard costs and these (for the panel structure) were used as the base for one of our prototypes in Chapter 1. (As noted there, the costs per sq. meter were adjusted to reflect cost differences implied by different amounts of floor space per unit--e.g., for any given type of structure, smaller units tend to have higher costs per sq. meter since walls occupy a higher percentage of the space).

Costs per sq. meter range from Kcs 3,359 for the poured concrete building up to Kcs 5,069 for the panel structure. After adjusting for differences in floor area per unit, the cost differences between panel technology and the brick and steel frame approaches are negligible. The estimate for the poured concrete structure does remain significantly lower (by one third) than that for the panel building but this does not imply poured concrete technology is inherently more efficient and should be advocated. As noted in Chapter 3, labor costs make up a very low percent of construction costs in the CSFR today, but that percent is sure to go up substantially as the economy develops. Poured concrete technology is labor intensive. For that reason, it is not favored in Western building markets and it is not likely to be an attractive option for the CSFR.

The second subcategory of Section 3 includes costs related to road development and landscaping. Costs for these items on Table A.1 cover only a portion of the site preparation and infrastructure costs implied by full private development of a 48 unit project. Therefore, we used an alternative (and more inclusive) approach to estimate costs for these items for the prototypes (as described in Chapter 1).

Section 4: Equipment and Interior Finishing, and Section 5: Artistic Work

No costs are typically assumed in these categories for residential projects.

Section 6: General Conditions and Allowances

Estimated costs in these areas account for an unusually large (16 percent) share of total costs: i.e., this category is one of the main contributors to the upward bias caused by the handbook estimating system. "General Conditions" are estimated at 3 percent of construction hard costs. These include real outlays for items needed during the construction process (e.g., site trailer, fencing). This estimate appears reasonable in light of international experience, and we included it in cost estimates for the prototypes in Chapter 1.

It is in the other two subcategories ("Regional Influences" and "Technical Allowances") that the major bias occurs. These categories were originally provided to give some allowance for unusually high-cost locations and construction techniques. But, high allowances are virtually always applied regardless of real conditions. (We did not include allowances of these types in the prototype cost estimates).

Section 7: Other Costs

For residential work, this includes only the cost of surveying the site (a standard estimate of Kcs. 35,000).

Section 8: Reserve

A standard reserve equal to 8 percent of construction costs (Section 3) is provided for all projects. We considered this to be reasonable and have included it in the estimates for the prototypes).

Section 9: Other Investments

The only item in this category is the land acquisition cost. (Again, we have used more realistic figures in the prototype estimates--see Chapter 1).

Section 10: Costs Paid by Other Investors

None are assumed in these estimates.

Section 11: Turnkey Fee and Investor Inspection

These items together are roughly consistent with Western definitions of "project management". They add to 4 percent of the construction costs (Section 3). We have used the 4 percent rate to calculate this category in the prototype estimates.

LOW-RISE STRUCTURES

Table A.2 presents the base cost estimates for three low-rise structures: a single family house; a row house; and a four unit apartment building (prepared by the staff of the Ustav Racionalizace ve Stavebnictve, or URS). These estimates include construction hard costs only. To develop construction hard cost estimates for the prototypes based on these models, we: (1) made adjustments to account for the influence of variations in space per unit (see discussion above), and (2) added appropriate amounts for the cost of utility hook-ups (which was not included in the costs in Table A.2).

The estimates on Table A.2 provide more detail on the composition of construction hard costs than was made available for the high-rise models. As would be expected, vertical and horizontal structures dominate the totals, accounting for 40 percent for the single family house, 29 percent for the row house and 31 percent for the apartment building). Other sizeable cost elements for all types include: foundations, stucco, carpentry, cabinetry, locks and hardware, and electrical wiring and fixtures.

Table A.2
COST ESTIMATES FOR LOW RISE PROJECTS

	Char. and Costs			Pct. of Costs		
	Single Family	Row House	Apt. Bldg.	Single Family	Row House	Apt. Bldg.
CHARACTERISTICS						
No. housing units	1	1	4	-	-	-
Bldg.footprint (sq.m)	84	80	211	-	-	-
Tot.floor area (sq.m)	200	240	651	-	-	-
Per unit (sq.m)	200	240	163	-	-	-
Unit area (sq.m)/unit	200	240	148	-	-	-
CONSTRUCTION COST PER SQ.METER (KCS)						
Ground work	62.1	26.3	32.4	2.1	1.1	1.3
Foundations	105.4	95.4	69.4	3.6	3.9	2.7
Vertical structures	806.2	442.9	552.3	27.3	18.1	21.5
Horizontal structures	379.1	271.3	249.4	12.8	11.1	9.7
Stucco	329.0	301.7	224.7	11.1	12.3	8.8
Pipelines	7.7	33.3	10.6	0.3	1.4	0.4
Other construction	60.4	65.0	66.1	2.0	2.7	2.6
Movement of mat'l's	125.0	68.3	36.1	4.2	2.8	1.4
Roof-water insulation	17.0	18.8	20.3	0.6	0.8	0.8
Roof-asphalt sheeting	0.0	51.7	0.0	0.0	2.1	0.0
Roof shingles	37.4	0.0	30.1	1.3	0.0	1.2
Roof-energy insul.	65.0	138.8	75.4	2.2	5.7	2.9
Sound insulation	0.0	0.0	22.1	0.0	0.0	0.9
Sewer-interior	67.2	53.8	29.3	2.3	2.2	1.1
Water-interior	30.6	20.4	35.2	1.0	0.8	1.4
Gas-interior	0.0	15.4	0.0	0.0	0.6	0.0
Machines	0.0	0.0	29.8	0.0	0.0	1.2
Toilets/sinks	23.8	20.0	40.4	0.8	0.8	1.6
Boiler	27.2	71.3	20.3	0.9	2.9	0.8
Heating	35.7	21.3	6.6	1.2	0.9	0.3
Plumbing	38.3	20.8	26.3	1.3	0.9	1.0
Valves, etc.	8.5	5.8	7.5	0.3	0.2	0.3
Radiators	62.9	22.5	29.0	2.1	0.9	1.1
Carpentry/frame./wind.	133.5	130.8	179.5	4.5	5.3	7.0
Sheet metal	23.0	33.8	34.9	0.8	1.4	1.4
Cabinetry	165.8	132.1	221.5	5.6	5.4	8.6
Locks and hardware	101.2	131.3	102.1	3.4	5.4	4.0
Floors-tile	30.6	92.1	86.0	1.0	3.8	3.4
Floors-linoleum	27.2	0.0	41.0	0.9	0.0	1.6
Wall tiles	27.2	0.0	0.0	0.9	0.0	0.0
Painting-trim	21.3	43.3	61.3	0.7	1.8	2.4
Painting-other	14.5	17.9	14.9	0.5	0.7	0.6
Glazing	0.0	0.0	2.8	0.0	0.0	0.1
Other electrical	118.2	104.2	205.8	4.0	4.3	8.0
Total	2,950.3	2,450.0	2,563.0	100.0	100.0	100.0

Annex B

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