We use monthly production data from January 2009 to October 2011 for the main stages of steel value chain in Chinese steel facilities, i.e. sintering, pig-iron making and steel making. We provide a detailed explanation for the variables in the data as follows.

Table 1: Variable List

| Chinese characters | Translated variable names | Explanation |
|---|---|---|
| Panel A: Sintering | | |
| 项目名称 | fid | equipment name |
| 设备产量 | production | output in quantity |
| 合格率 | qualification | output qualification rate |
| 品位 | grade | sinter grade |
| 品位稳定率 | grade_stability | sinter grade stablization rate |
| 碱度 | alkalinity | alkalinity = CaO/SiO2 |
| 碱度稳定率 | alkalinity_stable | sinter alkalinity stablization rate |
| 转鼓指数 | tumbler | tumbler index: it is a relative measure of the resistance of the material to breakage or degradation by impact. The higher, the better. |
| 固体燃料消耗量 | fuel | consumpition of solid fuel per ton of sinter |
| 固体燃料折标煤 | std_coal | consumption of solid fuel in terms of standard coal per ton of sinter |
| 工序单位能耗 | energy | energy consumtion per ton of sinter |
| 返矿率 | return | return ratio of ore = returned sinter/(returned sinter + sinter sent to the furnace)*100% |
| 利用系数 | utilization | utilization rate = production of sinter ore/(time consumed*active sintering area) |
| 台时产量 | hourly | yield of machine-hour = output per hour per sintering machine |
| 日历作业率 | calendar | equipment operation rate = realtime (operation time)/(calender time-maintenance time) |
| 从业人员实物劳产率 | productivity | labor productivity = sinter output/average number of employees |
| Panel B: Pig-Iron Making | | |
| 项目名称 | fid | equipment name |
| 设备产量 | production | output in quantity |
| 合格率 | qualification | product qualification rate |
| 一级品率 | grade1 | rate of premium grade pig-iron |

| | | |
|---|---|---|
| 原料矿石消耗 | ore | consumption of iron ore per ton of iron produced |
| 入炉焦比 | coke | coke rate = consumption of coke per ton of iron produced |
| 综合焦比 | coke_equiv | the consumption of coke quivalence (coke, coal fine = 0.8 coke, and heavy oil = 1.2 coke) per ton of pig iron produced |
| 喷煤比 | coal_injection | coal rate = consumption of pulverized coal injected into furnace per ton of iron produced |
| 燃料比 | fuel | coke rate + injection coal rate + oil |
| 利用系数 | utilization | utilization rate = production of iron/(time consumed*furnace volume) |
| 休风率 | downtime | downtime percentage = downtime/(calendar time - maintenance or repair time) |
| 人造块矿使用率 | ore_made | (sinter + pellet)/total iron ore used |
| 入炉铁矿品位 | grade | ore grade |
| 平均热风温度 | hot_air | average temperature of hot air = sum of daily average temperature of hot air/days |
| 富氧率 | oxygen | oxygen rate = (0.21*air volume + oxygen volume*purity rate)/(air volume + oxygen volume) |
| 炉顶压力 | pressure | sum of daily average pressure on furnace roof-top/days |
| 从业人员实物劳产率 | productivity | labor productivity |
| 工序单位能耗 | energy | energy consumption per ton of iron |
| Panel B: Pig-Iron Making | | |
| 设备产量 | production | output in quantity |
| 钢锭合格率 | qualification | product qualification rate |
| 金属料消耗 | metal | consumption of metal per ton of steel |
| 钢铁料消耗 | steel_mat | consumption of material = (pig iron + steel scrap)/qualified output of steel |
| 生铁消耗 | pigiron | consumption of pig iron per ton of steel |
| 生铁块消耗 | ironlump | consumption of pig iron lump per ton of steel |
| 废钢铁消耗 | scrap | consumption of scrap steel per ton of steel |
| 其它原料含铁 | other_mat | consumption of other ferro-metal materials |
| 合金料消耗 | alloy | consumption of alloy metal per ton of steel |
| 工序单位能耗 | energy | consumption of energy in terms of standard coal per ton of steel = (fuel + power - recycled gas and heat)/steel in quantity |

| | | |
|---|---|---|
| 氧气消耗 | oxygen | consumption of oxygen per ton of steel |
| 冶金石灰消耗 | lime | consumption of metallurgy lime per ton of steel |
| 从业人员实物劳产率 | productivity | labor productivity |
| 利用系数 | utilization | qualified steel/(tons of convertor*calendar days) |
| 日历作业率 | calendar | total operation time/(number of furnaces*calendar time (h)); operation time = calendar time (h) - break time that are >=10 min |
| 冶炼时间 | time | steel making time = total operation time/number of operated furnaces |
| 炉衬寿命 | lining | life expectancy of converter lining |
| 氧气喷枪头寿命 | lance_life | life expectancy of oxygen blowing lance |
| 二次冶金比 | second | secondary steelmaking ratio (in the ladle) |
| 铁水预处理比 | smolten_treat | pre-treated iron/total iron into the furnace |